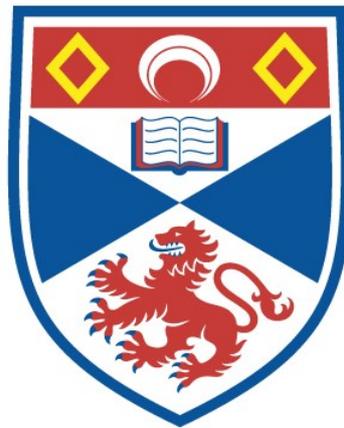


WAS KING JOHN OF ENGLAND BIPOLAR?  
A MEDICAL HISTORY USING MATHEMATICAL MODELLING

Janet Gillespie

A Thesis Submitted for the Degree of PhD  
at the  
University of St Andrews



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a medical history using mathematical modelling

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University of  
St Andrews

This thesis is submitted in partial fulfilment for the degree of

PhD

at the

University of St Andrews

1 February 2016



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## ***Abstract***

***Background*** - Bipolar disorder has been postulated as an explanation for King John's inconsistencies of leadership and vagaries of character. Changes in activity, matching those in mood, are core features of the condition.

***Method*** - A measure of King John's activity was derived from his travelling itinerary. Change Point Analysis (CPA) was used to detect significant changes in that travelling activity and from them, to identify clinically compliant, high and low, activity time periods. The results were tested against an alternative mathematical model (Bollinger Bands™), three alternative parameters and two comparator itineraries (familial & non-familial). Using primary historical sources and published analyses, bipolar symptoms were identified and their temporal relationship to the ICD-10 compliant CPA periods evaluated. The influence of circumstances was also evaluated using primary sources and a representative sequential sample (1200-1204).

***Results*** - CPA identified 83 periods of changed travelling activity. These changes were mathematically independent of the availability of the historical sources that underpin the itinerary. From these, 37 high and 22 low periods complied with current diagnostic guidelines and demonstrated descriptive and statistical similarities to those found in the bipolar literature. Analyses using alternative mathematical modelling and different parameters showed similar changes; analyses of comparator itineraries showed a possible familial trait. Of the 17 bipolar symptoms identified, all were found in CPA periods of appropriate polarity. Of the 23 sequential periods, 10 showed evidence of behaviour that was difficult to attribute to circumstances.

***Conclusions & Outcomes*** - The pattern of changes in King John's activity are highly suggestive of bipolar disorder with primary historical sources describing synchronous bipolar behaviour. This may alter our understanding both of King John and of *Magna Carta*. Change Point Analysis merits greater consideration when analyzing time based data, as does the use of activity as an objective marker of human behaviour.

***Key words:*** King John; Magna Carta; Bipolar disorder; Activity; Change Point Analysis; Bollinger Bands™; Mania; Depression.

## **Acknowledgements**

*Cleverness is not wisdom and not to think mortal thoughts is to see few days*

EURIPEDES (BACCHAE 1,395)

As a latecomer to academia, following a career in medicine and service as a magistrate, I know that *wisdom* gained from experience is hard won. So I owe a considerable debt of gratitude to the following for their academic generosity in so freely sharing their *wisdom* with me: Professor David Harrison and Dr Jen Burr, my supervisors; Professors Jim Bown, Alex Baldacchino, Daniel Smith, Simon Maclean and Hugh MacDougal; Doctors Dorothy Currie and Ruth Bowness. I also acknowledge the contribution of Professor John Hudson during my first year of study and more recently to Jon Crump for his patient collaboration in readying my data for his website. Thank you too, to Marion Ponthus for checking some of my key French translations and to the staff of St Andrews University Library and CAPOD for their "can do" attitude and cheerful interest. Further, I pay my dues to those many individuals who collate, write and update the internet and in so doing, have provided me with access to a global corpus of current knowledge and ideas. These include local historians and in particular, I am grateful to Phil Tate and Michael Andrews, members of the Christchurch Local History Society, for their personal assistance in ascertaining the exact ownership of Blandford Forum on 17 June 1216. In contrast, by performing all the internet searches, all the calculations and many of the translations, I hold the lonely responsibility for any inadvertent errors of fact, calculation or translation and of any questionable judgement found in this document.

*To think mortal thoughts*, or at least those that are academic, is an indulgence. It also takes a strong family to share their space with another, especially when the latter family is virtual, extensive and medieval. That both our sons did not follow their parents into medicine but chose to study history, is entirely an exercise of their free will... and probably a measure of the incubation period of my interest. To them, and my extended family, friends and neighbours, I wish to express my heartfelt thanks for the constancy of their encouragement.

Lastly, the late Princess of Wales' infamous remark has morphed into our version: "there are three of us in this marriage... and one is a dead medieval monarch of uncertain mental health". So my husband Professor Stephen Gillespie deserves a medal with a *clever* citation such as:

"[Wo]mans best possession is a sympathetic wife [husband]"

EURIPEDES (ANTIGONE, FRAG 164 AMENDED)

But *Wisdom* says ... that doesn't even scratch the surface. So thank you Stephen, for all your support, both professional and personal ... and for sharing our *few days*.

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## **Chapter 1: INTRODUCTION**

### **Overview**

The traditional view of King John of England (born 1166, reigned 1199-1216) is one of a resounding failure as a king, compounded by a dubious personality and thus well deserving of his epithet: Bad King John. (Milne, 1927, Scott, 1820)

Modern historical interpretation now recognises the political and environmental circumstances that constrained King John, and the potential bias of contemporary observers. (Seel, 2012, Warren, 1957, Church, 2015) However, it continues to offer no coherent explanation of King John's character and his choice of actions, beyond their description and the dilemmas they posed. Even the oft quoted JR Green described an improbable personality:

*“Externally John possessed all the quickness, the vivacity, the cleverness, the good humour, the social charm which distinguished his house. His worst enemies owned that he toiled steadily and closely at the work of administration. He was fond of learned men like Gerald of Wales. He had a strange gift of attracting friends and of winning the love of women. But in his inner soul John was the worst outcome of the Angevins. He united into one mass of wickedness their insolence, their selfishness, their unbridled lust, their cruelty and tyranny, their shamelessness, their superstition, their cynical indifference to honour or truth. ... The closer study of John's history clears away the charges of sloth and incapacity with which men tried to explain the greatness of his fall. The awful lesson of his life rests on the fact that the king who lost Normandy, became the vassal of the Pope, and perished in a struggle of despair against English freedom, was no weak and indolent voluptuary but the ablest and most ruthless of the Angevins.”*

(Green, 1878-1880)

One historian Charles Petit-Dutaillis, attempted to address these apparent contradictions by suggesting that King John may have suffered from bipolar disorder, that his malady was recognised by his contemporaries and that there was a family history of similar behaviour. (See Chapter 2)

Bipolar disorder is unique in medicine by showing intermittent dysfunction of rapid onset and equally rapid resolution while reverting to normal function between times, a feature which is termed periodicity. It is a mood disorder, in contradistinction to a thinking (cognitive) disorder such as schizophrenia or a memory disorder such as dementia. Changes in mood are

matched by changes in physical activity, so that physical restlessness and an increased capacity for work feature alongside high mood or mania, whereas poverty of movement and lethargy is more commonly associated with low mood or depression. (APA, 2013) p4.(Gelder, 2005) pp98-101

Mental illness in a monarch is not a new allegation. Its investigation however is fraught by changes in medical practice, by historical differences in cultural values and not least, because it affects the mind, with its intangible qualities and issues of interpretation. However, if we accept the modern medical view of bipolar disorder, which demonstrates a worldwide incidence of 1%, and match that with the consistent clinical descriptions of the disorder that date from the 1st century AD, then it is not only possible but probable, that the course of history may have been influenced by this particular mental disorder. (Weissman et al., 1996, Neel, 2012) For example, although the potential madness of King John has not received any further academic scrutiny, the mental illness of George III of England, initially attributed to porphyria but now considered as more likely to have been bipolar disorder, has gained currency. (Peters and Beveridge, 2010a, Peters and Beveridge, 2010b) Charles VI of France suffered from episodic psychotic periods during which contemporaries described his "glass delusion" whereas the mental illness of his grandson, Henry VI of England received less prominence, with Shakespeare studiously avoided any mention of it in his history plays a century later. (Alger, 2001 ) These three examples coincidentally demonstrate a common theme of political loss, recalling George III's mishandling of his American subjects and the loss of that colony; the loss of control in France by Charles VI of France in favour of Henry V of England and lastly, the loss of Aquitaine to the French by Henry VI and subsequently his English throne to Edward IV. Whilst it is readily acknowledged that mental illness is not the only cause of political loss, such a repetitive pattern might suggest an association and also shed light on King John's loss of Normandy (1204) and the dissolution of the Angevin hegemony that once extended from the Pennines to the Pyrenees. In addition, it could be argued, his loss of royal autonomy to the baronial Council of 25, as proposed in *Magna Carta* (1215) follows a similar pattern. (MagnaCarta, 1215)

Such ephemeral ideas however, require a sure foundation on which to build coherent and convincing arguments. This study has turned to mathematics to construct a framework that is robust, transparent and replicable, and that might not only serve as a tool for future exploration of King John's historical textual evidence but also have application in current clinical practice.

Following scientific convention, the study formulated three null hypotheses – null because a negative statement is more difficult to refute, than it is to find evidence in support of a positive one. These statements were stepped or gated so that each had to be rebutted before the next was considered. In essence, the study took King John's itinerary, as collated by TD Hardy (1835), to calculate the king's travelling activity and used Change Point Analysis (CPA) to determine statistically significant periods of high or low activity (Chapters 3 and 4). These changes are of medical significance in bipolar disorder since variations in activity are as important to its diagnosis, as changes in mood. Equally, as a distance-based methodology, the investigation avoided the bias of opinion, whether historical or modern, conscious or unwitting, that is inherent in word-based analyses, perhaps even promoting the adage that "actions speak louder than words" (Chapter 4).

To ensure robustness, the model was tested against the mathematical characteristics of bipolar periods; against an alternative mathematical model; against other behavioural parameters, and against other comparators, both familial and non-familial (Chapter 4). It was then used as a tool to explore the textual evidence. Datable contemporary reports of possible bipolar behaviour were identified from primary historical sources and then related to the CPA periods (Chapter 5). Circumstantial evidence from primary sources was also identified and related to the CPA periods as a comparative analysis (Chapter 6).

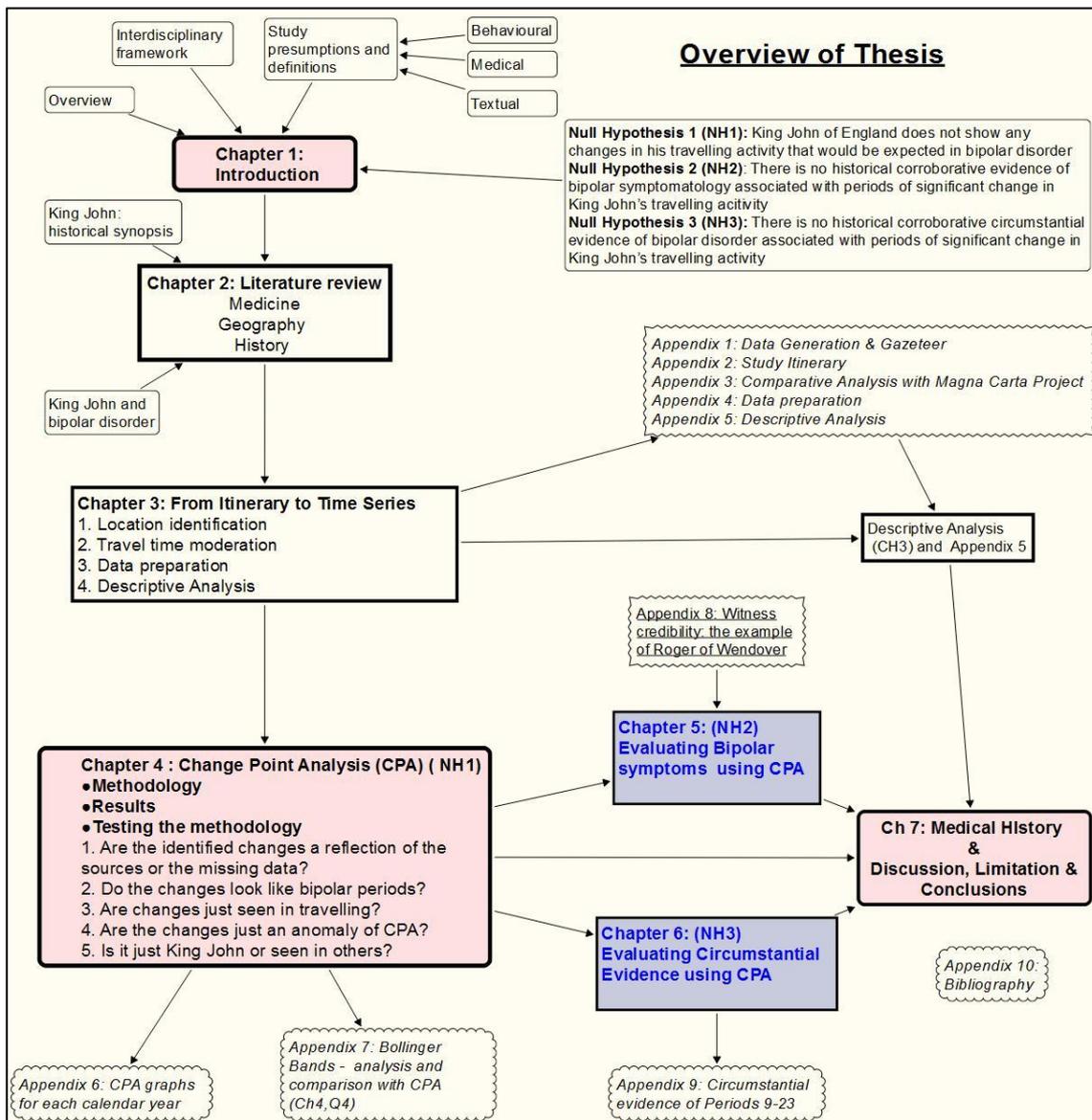
To promote transparency and allow replication, the study provides 10 appendices that show the study primary data (Appendices 1 & 2); a comparative analysis with the *Magna Carta* Project to test the reliability of location identification by the study (Appendix 3); how the data was generated and prepared for analysis (Appendix 4) and additional details of the descriptive analysis (Appendix 5). Further, the study presents the CPA graphs for each calendar year in Appendix 6; further details of the analysis using the alternative mathematical model (Appendix 7); an assessment of witness credibility from the primary sources using the example of Roger of Wendover (Appendix 8) and the analysis of circumstantial evidence collated under Periods 9-23 which were placed in Appendix 9 to keep the submission within the required word length. A study bibliography is provided in Appendix 10 to supplement the Harvard references.

In the Discussion, the study adopted the medical style of presentation, where the gathered evidence was formally collated in a structured "medical history" prior to discussion of the study limitations and the key question "*Was King John of England bipolar?*" (Burton and Birdi, 2006, Gelder, 2005), (Chapter 7).

Finally and for completeness, although this is a medical investigation, as the study subject is historical and the itinerary data was specifically published by the Royal Commission for public use, the study was not considered to require medical ethics approval. (Personal Communication SEC, 2016)

A diagrammatic overview of the thesis structure is provided below and highlights the essential elements of the submission (pink) and the application of the methodology (blue).

Figure 1: Diagrammatic overview of thesis



### ***Interdisciplinary research: ground breaking or rule breaking?***

As an example of interdisciplinary research, this study has attracted conflicting attention: fascination over its ground breaking nature, and fear that rule breaking might introduce flaws that could lead to false conclusions. Equally, the study has been conscious of the divisive interdisciplinary contentions that have arisen during the last half century. (Leavis, 2013, Snow, 1998) It has also recognised the practical differences in the aims of different academic disciplines, in their methods of data handling, in the languages and vocabulary of their communications, and in the styles and collaborative nature of their outputs.

So the submission has sought to combine best academic practice irrespective of discipline. For example, although it used the medical convention of gathering information in order to make a diagnosis, it also investigated and addressed historical concerns over the influence of the sources that underpin TD Hardy's itinerary. This arises because, although history has the benefit of hindsight, it has no control over the data that has survived; this is equivalent to having no control over the selection of a study population in medical research. Likewise, the study found issues relating to translation not only between languages, whether living or historical, but in dealing with contracted texts (the medieval equivalent of modern texting symbols) and the equally specialised language of mathematics. Conscious that the readership of this submission may also be interdisciplinary, I have therefore used analogies (as seen above) and provided original text with matching translation, in order to ensure clarity.

Diverse presentation styles reflect communication norms within different academic communities. This medical submission used scientific convention in the main but drew on the historical practice of rhetorical debate, to investigate specific questions, as shown in the testing the methodology and in the final discussion (Chapters 4 and 7). Likewise, the document was referenced following scientific convention using the Harvard format and a citation index. However, in using many textual sources from other disciplines, the submission appended book page numbers to some citations to ensure clarity. In addition, as many other textual resources have influenced this work beyond those cited, the study presents a bibliography in Appendix 10.

## ***Study Presumptions, Definitions & Hypotheses***

### ***Behavioural Presumptions and Definitions***

The study defined behaviour as "*actions or inactions to internal and/or external stimuli, excluding responses more easily understood as developmental changes.*" (Levitis et al., 2009) Actions in response to external stimuli are well understood in daily living, such as retracting the hand after touching something hot. Actions in response to internal stimuli are also common, as when an individual seeks food in response to hunger. Actions and inactions are also seen in mental illness where the internal stimuli of the disorder drive actions or inactions such as the hyperactivity of mania or the suicidal actions of depression. The study also considered that King John's behaviour – his actions or inactions – was not only shaped by universal influences such as genetics, personality, cultural norms, religious beliefs, and physical illness, but also by peculiar determinants arising from his position as ruler - politico-royal constraints and demands. In addition and by reason of the historical nature of the investigation, the study recognised that any markers of behaviour were by necessity, and by definition, a representation of King John's global activity.

The study considered that history is essentially a record of past human behaviour, a concept that bridges the arbitrary demarcation between history and pre-history which is centred on the development of writing. (Clanchy, 2013) The historical consistency of human behaviour is not only demonstrated anthropologically (Marchetti, 1994, Renfrew, 2007) but is also implied from our unchanging biochemistry such as the fear/flight response governed by adrenaline, and our ability to understand and empathise with the dilemmas of our predecessors e.g. Gilgamesh, Psalms (Sandars, 1960, Bible) Similarly, and of particular relevance to this study, recent work in neuro-anatomy has demonstrated the neural basis of route following and way finding (Hartley et al., 2003). In particular, Hartley and colleagues have shown that "*the hippocampal formation contains representations of both the Euclidean distance and path distance to goals during navigation*". (Howard et al., 2014) The study therefore inferred that the mere 800 years since the time of King John is not significant in evolutionary terms, nor in terms of physiology or biochemistry, and therefore does not require additional behavioural interpretation beyond the cultural and religious differences between that period and today. This means that King John's behaviour should mirror our own when faced by similar circumstances, unless there were overriding personal (such as mental illness), cultural or religious reasons.

## ***Medical Presumptions and Definitions***

Although behavioural research is traditionally the remit of psychology, this was a medical investigation using the medical model of aetiology i.e. relating patterns of symptoms and signs to pathological findings or disease entities.

## ***Textual Presumptions and Definitions***

Wherever possible, the study sought to support its evaluation of textual evidence by statistical testing and by assessing the weight of evidence.

## ***Hypotheses***

The methodology used a "staircase" or "gated" set of null hypotheses:

### **First Null Hypothesis**

This addressed the essential question of whether there is any evidence of bipolar disorder by saying:

***King John of England does not show any changes in his travelling activity that would be expected in bipolar disorder in that***

- ***periods of high and/or low travelling activity do not demonstrate features that characterise bipolar disorder periods.***
- ***periods of high and/or low travelling activity are not demonstrated by an alternative mathematical model***
- ***comparable high and/or low activity is not found in other activities carried out by King John***
- ***comparable high and/or low travelling activity is not found in either familial or non-familial comparators.***

### **Second Null Hypothesis**

If the first null hypothesis was refuted to suggest that there was evidence of behavioural changes suggestive of bipolar disorder, then the medical diagnostic evidence was investigated in the second null hypothesis:

***There is no historical corroborative evidence of bipolar disorder symptomatology associated with medically compliant periods of significant change in King John's travelling activity.***

### **Third Null Hypothesis**

If the second null hypothesis was refuted to suggest that there was synchronous evidence of bipolar symptomatology relating to the medically compliant CPA periods, then evidence from circumstantial evidence and all CPA periods was considered in the third null hypothesis:

***There is no historical corroborative circumstantial evidence of bipolar disorder associated with any periods of significant change in King John's travelling activity.***

This was a comparative and inclusive analysis: comparative when considered against the evidence for Null Hypothesis 2 and inclusive of all CPA periods rather than excluding those that did not comply with clinical criteria. Refuting the third hypothesis therefore would suggest that there was evidence of bipolar behaviour when all CPA periods, and their historical context, were considered.

## ***Chapter 2: LITERATURE REVIEW***

From the hypotheses of this study, it is postulated that King John's itinerary may have been influenced by his mental health. However, that itinerary was also constrained by his physical environment, and has been described and discussed by historians. The literature review therefore provides a brief synopsis of King John's reign (2.1) and a detailed account of Dutailis' claim, before drawing on the three academic disciplines of medicine, geography and history, to explore the pertinent issues:

### **2.1 King John (reigned 1199- 1216): a brief synopsis**

### **2.2 King John and bipolar disorder**

### **2.3 Bipolar disorder (Medicine)**

### **2.4 Travel time, Itineraries and Medieval travel (Geography & History)**

### **2.5 Contemporary accounts and Modern historiography (History)**

### ***2.1 King John (reigned 1199-1216): a brief synopsis***

This brief synopsis of the life of King John (born Oxford, 1166), draws on the works of Warren, Powicke, Holt, Painter, Baldwin, Bradbury, Crouch, Church, Turner and Steel to establish the key facts of his reign. (Warren, 1978, Powicke, 1913, Holt, 1963, Painter, 1949, Baldwin, 1986, Bradbury, 1998, Crouch, 1990, Gillingham et al., 1999, Turner, 2005, Seel, 2012, Church, 2015)

The youngest sibling of four brothers (one died in infancy and two in early adulthood) and three sisters, John was the unlikely successor of his surviving brother Richard, to the throne of England, the Dukedom of Normandy and the Counties of Anjou and Maine. His succession was contested by his nephew Arthur, the teenage son of John's elder brother Geoffrey. Despite a political resolution between the parties, Arthur broke its terms and was captured by John in a military skirmish at Mirebeau in 1202. Arthur's subsequent disappearance whilst being held in captivity by John fuelled rumour and mischief, especially at the French court.

John's mother was Eleanor, Duchess of Aquitaine who had married his father, Henry, Duke of Normandy and Count of Anjou following her divorce from Louis VII, King of France in

1151. Three years later Henry became King of England.

However, John lost control of Normandy in 1203, and then of Maine and Anjou in 1204, to the French monarch Philip II (son of Louis VII by his third wife, born 1165). A contemporary of both Richard and John, Philip was wily and strategically focused on extending the boundaries of his tiny personal inheritance, based around the L'Isle de France, Paris. Against this relentless ambition, King John spent the remaining years of his reign trying to reclaim his continental inheritance by military means, notwithstanding additional campaigns against the Welsh, Irish and Scots. He led two trans-marine expeditions to the continent. The first in 1206, had limited impact but the second in 1214, as the southern force of a two pronged, Northern European alliance, had more success. However, John was forced to withdraw when his allies lost to Philip at the battle of Bouvines (27 July 1214). This battle became to French history what the battle of Hastings is to the English and is considered validation of King Philip's self chosen epithet *Augustus*, alluding to the Roman Emperor, even if wily Odysseus might have been more apt.

His political struggles aside, King John was also subject to personal criticism by contemporaries and whilst popularity was not a prerequisite for the exercise of power within an hereditary system, the ensuing lack of confidence and loss of respect by his barons undermined its foundation. This led, not only to the negotiations at Runnymede and the issue of *Magna Carta*, but also to the eventual transfer of allegiance by all but a few barons, to Prince Louis, heir to Philip and husband of John's niece, who landed in England by their invitation in May 1216. In particular, King John was accused of tyranny, vacillation, sexual predation and violence. He was charged with preferring self made men and in particular those of Anjou, whom both those of Norman and English descent termed foreigners. Finally, in an age when many monarchs were excommunicate for a time and when King John's reasons for disagreeing over the appointment of the Archbishop of Canterbury were widely understood, his contemporaries criticised him for delaying the resolution of papal displeasure. Equally, they commented adversely on his subsequent and immediate about-face when he swore allegiance to the Pope and made England a papal fiefdom.

King John's unexpected death in Oct 1216 allowed the realignment of the English barons in support of his 9 year old son, Henry III and the establishment of the Plantagenet dynasty.

## 2.2 King John and bipolar disorder

*"It is, indeed difficult to understand the king's mind..."*

(Powicke, 1913)

King John's behaviour and its underlying motivation has been the source of comment by both his contemporaries and subsequent commentators. While an overview of the relevant literature follows, this section reviews Dutailis' specific contribution in detail.

Bipolar disorder or "*psychose périodique*" was first mooted as a possible explanation for the behaviour of King John by Charles Petit-Dutailis in *Le Déshéritment de Jean sans Terre et le Meurtre d'Arthur de Bretagne*. (1925):

*Les textes donnent l'impression que Jean était un malade. Il serait intéressant, pour un historien médecin, d'étudier son cas. Ce sinistre personnage nous présente les symptômes de l'état pathologique que les aliénistes appellent « psychose périodique ». ... Jean était justement dans l'état mental où un déséquilibré commet un crime dans sa propre famille et s'assure qu'il a bien fait.*

(Petit-Dutailis, 1925)p24

[THE TEXTS GIVE THE IMPRESSION THAT JOHN WAS AN ILL PERSON. IT WOULD BE INTERESTING FOR A DOCTOR HISTORIAN TO STUDY HIS CASE. THIS SINISTER FIGURE PRESENTS THE SYMPTOMS OF THE CONDITION THAT PSYCHIATRISTS CALL "PERIODICAL PSYCHOSIS". JOHN WAS PRECISELY IN A MENTAL STATE WHEREBY AN UNBALANCED PERSON COMMITS A CRIME WITHIN THEIR OWN FAMILY AND ENSURES THAT IT IS DONE WELL]

TRANSLATION: MARION PONTUS

In 1933, Petit-Dutailis expanded this idea in *La monarchie féodale en France et en Angleterre, X<sup>e</sup> - XIII<sup>e</sup> siècle* (1933) the translation of which (*The Feudal Monarchy in France and England*, 1936) received a positive general appraisal from the *Spectator* newspaper (4 June 1936). However it was not reviewed by the *English Historical Review*, nor does there seem to be any other contemporary comments in English on the "*psychose périodique*". Dutailis wrote:

*It is our opinion that John Lackland was subject to a mental disease well known today and described by modern psychiatrists as the periodical psychosis. It is surprising that modern historians have been able to estimate his character so wrongly and suggest for instance that he was a villain whose wickedness was cold and deliberate, who never allowed passion to guide him, and must, therefore, be regarded as all the more unpardonable. On the contrary John was unstable and irresponsible. He carried as well a heavy burden of unwelcome legacies from his father's family; among his Angevin ancestors were fools and madmen and the life of Fulk IV the Surly presents singular analogies to his.*

(Petit-Dutailis, 1936) pp. 215,216

Fulk IV was the great-great-grandfather of King John. His daughter Ermengarde, and elder sister of King John's great-grandfather, is alleged to have been subject to significant and violent mood swings. (Weir, 2000) Finally in 1937, Dutailis published his opinion for a third time, stressing that:

*Dans l'accès de manie, le cyclothymique se montre actif, affairé, déploie un esprit d'entreprise; il est moqueur, hautain; si son excitation grandit, il devient cynique, paillard, coléreux, cruel. Pendant les accès de dépression, il est indifférent à tout, reste longtemps couché; parfois il a des angoisses, la peur du châtiment.*

(Petit-Dutailis and Guinard, 1937)p. 135

[DURING AN ATTACK OF MANIA, THE CYCLOTHYMIC TENDS TO BE ACTIVE, BUSY, DEPLOYING AN ENTREPRENEURIAL SPIRIT; HE IS MOCKING, HAUGHTY; IF HIS EXCITEMENT GROWS, HE BECOMES CYNICAL, LECHEROUS, ANGRY, CRUEL. DURING BOUTS OF DEPRESSION, HE IS INDIFFERENT TO EVERYTHING, LINGERS IN BED; SOMETIMES HE IS ANXIOUS, FEARFUL OF PUNISHMENT.]

TRANSLATION MARION PONTIUS

Dutailis came from an extensive and distinguished medical family and was a well-respected French medieval historian. (Geneanet.org) Perhaps writing *sans frontières*, he was at an academic disadvantage but HWC Davis acknowledged his contribution when, in reviewing Dutailis' *Studies and Notes Supplementary to Stubbs' Constitutional History in Two Volumes* (French edition 1908/English 1911 & 1914), Davis wrote,

*M. Petit-Dutailis is by no means content to analyse recent monographs. He has followed up the minutest controversies, and he rarely fails to pronounce an independent opinion. It is remarkable to find a French historian so thoroughly acquainted with the special literature of English history.... he is better fitted than most English students for the difficult work which he had undertaken... He has in fact paid to Stubbs a compliment which ought to have been paid before this by Stubbs's [sic] own countrymen, the compliment of adjudicating as far as possible between a great author and the innumerable critics who had made their reputation by correcting him.*

(Davis, 1908)p339

It is therefore perhaps misleading to render this as Davis "... expressed some surprise that a Frenchman could know the sources of English constitutional history so well and said that M. Petit-Dutailis was really adjudicating between Stubbs and those who had made their reputations by correcting Stubbs." when Sidney Packard wrote his reflections on the life and work of Dutailis some forty years later. (Packard, 1959)

Dutailis' theory was widely ignored by both contemporary and successive historians. This is best exemplified by an extensive search of the historical literature from 1925 to 2005, including Powicke (Powicke, 1913); Painter (Painter, 1949); Jolliffe (Jolliffe, 1963); Holt (Holt, 1961, Holt, 1963, Holt, 1992); Duby (Duby, 1973); Church (Church, 1999, Church, 2007, Church, 2015); Gillingham (Gillingham, 1978, Danziger and Gillingham, 2003); Turner (Turner, 1994,

Turner, 2005) and the multi-author text, *King John: New Interpretations*, edited by SD Church (Gillingham et al., 1999), and which revealed only one academic reference by WL Warren who commented:

*"The French historian, Charles Petit-Dutaillis, has suggested that John suffered from cyclothymia, a mental derangement which shows itself in periods of violent activity alternating with periods of utter lethargy. But this is merely to put a medical term on tainted testimony. The administrative records show that John was busy all the time, though nothing he did helped to save the defences of Normandy from collapse."*

(Warren, 1978)

More recently however, there appears to be growing support for Dutaillis in popular history, as illustrated by Frank McLynn, who lists Dutaillis (1925) in his bibliography and writes:

*John was in many ways a psychological oddity. The alternating burst of frenetic energy and lethargy suggest a manic-depressive tendency towards "bipolar affective disorder" or "cyclothymia". ... Yet when all the allowances for the bias of hostile witnesses have been made, what remains is a clear indication of manic-depressive behaviour, bipolar affective disorder, cyclothymia – a diagnosis which would also account for the violent mood swings and tempestuous rages.*

(McLynn, 2006)

Likewise, Professor David Starkey believes that King John *"was clearly manic depressive, with extraordinary bursts of energy alternating with total passivity, and prone to acts of extreme indulgence..."* even if Starkey somewhat spoils his understanding of this mental illness by concluding, *"I think he was a spoilt brat."* (Starkey, May 2015)

## **2.3 Bipolar Disorder**

Bipolar disorder is a recurrent mental illness that exhibits polar extremes of high or low mood and activity, which are uniquely periodic. The following section has three aims that are interwoven within the text: to provide a general understanding of the disorder; to explore specific issues in detail that are pertinent to the interpretation of the study results, and to place the study within its academic context. It is divided into the following subsections:

- 2.3.1 Acronyms & Terms**
- 2.3.2 Diagnostic guidelines**
- 2.3.3 Historical Overview of Bipolar Disorder**
- 2.3.4 Clinical Presentation**
- 2.3.5 Period Characteristics**
- 2.3.6 IQ, Personality, Creativity and Leadership**
- 2.3.7 Co-morbidities and triggers**

### 2.3.8 Differential diagnoses

### 2.3.9 Prognosis

### 2.3.10 Comparative methodologies in historical psychiatry

### 2.3.11 Summary

#### 2.3.1 Acronyms & Terms

There are two commonly used acronyms for this psychiatric condition namely the recent, Bipolar Affective disorder (BAD) or the older, Bipolar disorder (BPD). In order to avoid any inadvertent associations, this study prefers the acronym BD or the term bipolar disorder, rather than BAD with its implied moral stigma, or any potential confusion with Borderline Personality Disorder (BPD).

#### **Clinical Terminology**

For the sake of brevity, the term *mania* was taken to be an overarching term and inclusive of hypomania, unless otherwise stated.

Clinical terms such as Bipolar I and Bipolar II disorder were found in the literature and used in guidelines e.g. the Diagnostic and Statistical Manual of Mental Disorders; the National Institute of Mental Health. (DSM-5, 2013, NIH, 2015) Thus, *Bipolar Type I* disorder shows manic or mixed episodes lasting 7 days or requiring immediate hospital care and depressive episodes lasting at least 2 weeks, whereas *Bipolar Type II* show a predominant pattern of depressive episodes with some hypomanic episodes but no full blown manic or mixed episodes.

*Mixed features* is a term that refers to the occurrence of symptoms of the opposite pole during a high or low period, such as sleeplessness and racing thoughts during a low period characterized by feeling hopeless, despairing or even suicidal.

*Cycling* is the term used when there is no normal behavioural period between bipolar periods i.e. when depression abruptly switches to mania/hypomania or vice versa and which are also termed swings in this study. *Rapid cycling* is defined as four or more episodes occurring in one year. *Ultra-rapid cycling* is a controversial phenomenon where episodes occur within 7 days or even within 24h.

Changes to or from normal levels are termed *unipolar*; changes from pole to pole, or the extremes, are termed *swings*. *Switching* is a term that is also used in ICD-10 to denote the suddenness of the change in mood and activity at the start or end of an episode.

### **2.3.2 Diagnostic Guidelines**

Diagnostic guidelines are medical reference documents written by senior clinicians that are designed to root daily clinical practice in Evidence Based Medicine (EBM). (Lohr et al., 1998) In addition to performing metanalyses, EBM draws on individual medical publications which mostly deal with such matters as single issues relating to a particular disease, rare or unusual presentations, or evaluations of responses to therapy. Diagnostic guidelines therefore represent an acceptable standard of practice that is peer reviewed and regularly updated. There are many guidelines for the common disorders, often exhibiting small variations in emphasis or terminology that reflect local clinical experience and health care provision. As collations of the relevant medical literature and the distillation of clinical expertise, they are regarded as authorities in their own right, not least because deviation from them can form the basis for litigation. (Day, 1999)

The study uses the definition of bipolar disorder and its diagnostic criteria described in the International Classification of Disease 2010 (ICD-10), in association with the Diagnostic Research Criteria (DCR-10) which are guidelines published by the World Health Organisation (ICD-10, 2010) to "*provide a framework for comparison of data gathered in different centers [sic], and serve to promote communication between investigators.*" (Feighner et al., 1972) However it also draws on other guidelines e.g. DSM V, published by the American Psychiatric Association, so as to encompass current clinical opinion and so that minor differences in terminology in the literature can be better understood. (DSM-5, 2013)

#### **Bipolar Disorder**

The ICD-10 states that bipolar disorder is:

*A disorder characterised by two or more episodes in which the patient's mood and activity levels are significantly disturbed, this disturbance consisting on some occasions of an elevation of mood and increased energy and activity (hypomania or mania) and on others of a lowering of mood and decreased energy and activity (depression). ... Episodes are demarcated by a switch to an episode of the opposite or mixed type or by a remission.*

This is further refined in the DCR-10 which states that elevation of mood should be sustained for at least 4 consecutive days and associated with the presence of at least 3 (of 7) clinical signs of sufficient degree as to interfere with daily living:

- 1 . *Increased activity or physical restlessness*
- 2 . *Increased talkativeness*
- 3 . *Difficulty in concentration or distractibility*
- 4 . *Decreased need for sleep*

5. *Increased sexual energy*
6. *Mild overspending or other types of reckless or irresponsible behaviour*
7. *Increased sociability or over-familiarity*

The guidelines note that sometimes the mood is marked by *irritability or suspiciousness rather than elation... Change of mood must be prominent and sustained for at least 1 week* and associated with 3 of the following signs if the mood is suspicious or 4 if merely irritable:

1. *Increased activity or physical restlessness*
2. *Increased talkativeness ( pressure of speech)*
3. *Flight of ideas or the subjective experience of thoughts racing*
4. *Loss of normal social inhibitions resulting in behaviour that is inappropriate to the circumstances*
5. *Decreased need for sleep*
6. *Inflated self-esteem or grandiosity*
7. *Distractibility or constant changes in activity or plans*
8. *Behaviour that is foolhardy or reckless and whose risks the individual does not recognize e.g. spending sprees, foolish enterprises, reckless driving*
9. *Marked sexual energy or sexual indiscretions*

In contradistinction, lowered mood should be sustained for at least 2 weeks. In mild depression, this is associated with two of the following (1 –3):

1. *depressed mood to a degree that is definitely abnormal for the individual, present for most of the day and almost every day, largely uninfluenced by circumstances, and sustained for at least 2 weeks*
2. *Loss of interest or pleasure in activities that are normally pleasurable*
3. *Decreased energy or increased fatiguability [sic]*

and the addition of 2 of the following list of symptoms (4 –10):

4. *Loss of confidence or self esteem*
5. *Unreasonable feelings of self-reproach or excessive and inappropriate guilt.*
6. *Recurrent thoughts of death or suicide, or any suicidal behaviour*
7. *Complaints or evidence of diminished ability to think or concentrate e.g. indecisiveness or vacillation*
8. *Change in psychomotor activity with agitation or retardation*
9. *Sleep disturbance of any type*
10. *Change in appetite with corresponding weight change*

Moderate depression is a matter of scale, requiring a similar choice between (1 –3) and any 4 of the remaining list. Likewise severe depression requires all (1 –3) and any 5 of the remaining list.

### **Cyclothymia**

The ICD-10 defines cyclothymia as:

*A persistent instability of mood involving numerous periods of depression and*

*mild elation, none of which is sufficiently severe or prolonged to justify a diagnosis of bipolar affective disorder or recurrent depressive disorder. This disorder is frequently found in the relatives of patients with bipolar affective disorder. Some patients with cyclothymia eventually develop bipolar affective disorder.*

Cyclothymia is also an older terminology for BD and, despite this modern differentiation, is presumed to be bipolar disorder when found in an historical context. (Brieger and Marneros, 1997)

### ***Bipolar disorder and activity***

The American Psychiatric Association, in their *Highlights of Changes from DSM-IV-TR to DSM-5*, has drawn particular attention to the additional importance of changes in activity that matches the classical changes of mood in bipolar disorder saying:

*To enhance the accuracy of diagnosis and facilitate earlier detection in clinical settings, Criterion A for manic and hypomanic episodes now includes an emphasis on changes in activity and energy as well as mood.*

(DSM-5, 2013)

This re-emphasis on activity uses a history of publications that date back to Beigel and Murphy who demonstrated a difference in activity, among other characteristics, between 25 unipolar and 25 bipolar depressed patients in 1971. (Beigel and Murphy, 1971) Similar differences were also noted by Kupfer and colleagues who used telemetric activity recordings to investigate the therapeutic response of 11 inpatients, but not found by Kuhs and Reschke who used actometric monitoring on 37 patients over 48h. (Kupfer et al., 1974, Kuhs and Reschke, 1992) Recent technological innovations have allowed Faurholt-Jepsen and colleagues to use a combination of physical acceleration and heart rate monitoring, in conjunction with a step test, to compare the activity of unipolar (n=20), bipolar (n=18) and health controls (n=31) over three consecutive days. Their results suggested that "*Electronic monitoring of psychomotor activity may be a promising additional tool in the distinction between unipolar and bipolar affective disorder when patients present in a remitted or depressive state.*" (Faurholt-Jepsen et al., 2012)

### ***2.3.3 Historical overview of bipolar disorder***

The diagnosis and management of Hippocrates' four humours – blood, phlegm, yellow bile and black bile – underpinned classical Greek medicine and remained the basis of European

clinical practice until the collective scientific discoveries of the 17<sup>th</sup> century. (Goodwin and Jamison, 2007) loc986, (Willis, 1847). Now discredited as the basis of pathophysiology, the use of humours to describe human temperament still lingers in our modern vocabulary: sanguine, phlegmatic, choleric and melancholic. Both Hippocrates and Galen attributed excessive yellow bile (*chole*) to mania and black bile (*melano chole*) to depression although Ackernknecht notes that to the Greeks "[m]ania simply meant an agitated form of insanity; melancholia a quiet one." (Ackerknecht, 1959) p14. Despite this generalisation, Aretaeus of Capadocia (1<sup>st</sup> century AD) described

*a group of patients who 'laugh, play, dance night and day, and sometimes go openly to the market crowned, as if victors in some contest of skill' only to be 'torpid, dull, and sorrowful' at other times.*

(Neel, 2012)

Whitwell also writes of Alexander of Tralles (525-625AD) who linked the two clinical presentations saying:

*Those affected with such a condition are not suffering from melancholia only for they tend to become maniacal periodically and in a cycle. Mania is nothing else but melancholia in a more intense form.*

(Whitwell, 1936) p175

Indeed, Goodwin and Jamison note that "*Medical conceptions of mania and depression are as old as medicine itself. From ancient times to the present, an extraordinary consistency characterizes descriptions of these conditions.*" Quoting Roccatagliata (1986), Goodwin and Jamison add that "*these diseases had long been interpreted as phenomena deriving from an underlying humoural [sic] disturbance*" and that "*this essentially biological explanation for the cause of melancholia survived until the Renaissance.*" They go on to say that "*as illness gradually became the responsibility of the priests, the [above] early insights were submerged. The period that followed was, in retrospect, a dark age...*" and "*[e]mpirical clinical observations without religious overtones did not reappear until the beginning of the seventeenth century.*" (Goodwin and Jamison, 2007) loc1050.

### **Medieval awareness**

In the wider sphere, a general appreciation of insanity in the thirteenth century can be inferred from evidence such as that found in the "*King's Prerogative*" (*Prerogativa Regis, 1255 to 1290*) where the mentally ill are grouped into

*..."natural fools" (that is suffering from congenital intellectual subnormality) and "non compos mentis" (meaning suffering from psychiatric disorders that could be temporary and marked by lucid intervals). The king was expected to protect*

*individuals belonging to these two categories and their property from exploitation.*

(Jackson, 2011)

Getz also notes that "[K]nights could also determine whether or not a person was mad" suggesting that the diagnosis did not require any medical training but was a matter of general acceptance. (Getz, 1991)

More pertinently *Gilbertus Anglicus*, who is thought to have served as King John's physician from at least 1207 and known to have promoted King John's cause at Rome in 1214, wrote a *Compendium medicinae* sometime before 1250. (Getz, 1991) This was a collection of medical recipes that drew on both Avicenna and Islamic customs, (Jackson, 2011) and the Greek classical traditions, (Getz, 1991) and which became influential for several centuries. In the compendium, *Gilbertus Anglicus* devotes entire sections of his first chapter to both mania and lethargy: *Mania is another sickness of the middle part of the brain* (Getz, 1991) (my translation from Middle English), while *malencoly* [sic] is found on twenty-eight occasions throughout the entire text. However Gilbertus does not include Avicenna's opinion that "*undoubtedly the material which is the effective producer of mania is of the same nature as that which produces melancholia*" but which would have been the accepted medical wisdom at the time of King John. (Whitwell, 1936)p181.

Numerous plant based remedies were used in the treatment of lunacy or insanity: peonia (peony), polion (sage-leaved germander or wood sage) or mandragora (mandrake) were ingested; plants such as buttercup (*Ranunculus acris* L.) were tied round the neck with red thread during the waning moon in April or early October. (Arsdall, 2002) Timing was equally important in another treatment – bloodletting – where the most inauspicious days during each month were governed by the zodiac. (Edson, 1996)

### **Modern concepts**

The modern view of "*circular insanity*" to use a term coined by Falret, returns to Alexander of Thralles' thesis and brings episodic mania and depression together under a unitary diagnosis. Conventionally, this began in the mid nineteenth century when French researchers Falret and Baillarger independently described and presented the concept within two weeks of each other in 1854. (Harre, 2006)p263-270. However, their ensuing academic rancour was essentially futile as the modern association had previously been made by Bonet (1686) as "*manico-melancolicus*". (Taylor, 2002)p745-757, (Angst and Sellaro, 2000)p445. In turn Bonet, a Swiss physician and pathologist who was renowned for his meticulous clinical observations,

undoubtedly had access to " *the most famous textbook of psychiatry prior to the modern era ... Robert Burton's Anatomy of Melancholy (1621)*". (Crellin)p212, (Harre, 2006). Burton's work however, is more of a personal reflection on depression than a comprehensive account and makes no mention of mania. (Burton, 2012)

Returning to the nineteenth century, in 1882 Karl Kahlbaum (1828-99) renamed the condition "*cyclothymia*" and Emil Kraepelin chose this term for his seminal psychiatric classification that remained in publication from 1883 to 1927. (Baethge et al., 2003), (Angst and Sellaro, 2000). It was not until 1957 however, that Karl Leonhard propounded the theory that "*unipolar and bipolar diseases were inseparable*" and a decade later, that current medical practice returned to its ancient principles and termed it an illness. (Leonhard, 1979, ICD-8, 1965, DSM-II, 1968).

### **2.3.4 Clinical Presentation**

#### ***Prevalence of bipolar disorder***

The US National Institute of Mental Health (NIMH) suggests that the lifetime prevalence of BD is 3.9% of the adult population (US) and in particular, 5.9% of the 18-29y population. *cited in* (Angst and Sellaro, 2000) However, Weissman and colleagues found that the life time rate per 100 for BD ranged from 0.3 in Taiwan to 1.5 in New Zealand, with the M:F ratio approximately equal and the mean age at onset between 18-27y. (Weissman et al., 1996) The current National Institute for Clinical Excellence guidelines (NICE, UK) quotes Weissman among others, before arriving at a similar figure.

#### ***Inheritance***

Kelsoe discusses the genetic basis of BD and suggests that the condition is "*better conceptualized from a genetic standpoint as a quantitative trait*" with "*a variety of phenotypes ranging from schizoaffective disorder to cyclothymic temperament*" although "*some forms of bipolar disorder... may be genetically distinct*". (Kelsoe, 2003) This view is supported by Kent and Craddock who agree that no single gene has been identified while recognising that the "*approximate lifetime risk of BD in relatives of a bipolar proband are: monozygotic co-twin 40-70%; first degree relative 5-10%; unrelated person 0.5-1.5%*." (Kent and Craddock, 2003).

## ***Natural history***

### **(1) Lifetime presentation**

The lifetime presentation or natural history of BD is an account of the recurrence and duration of periods, whether exhibiting mania or depression. Angst and Sellaro in their review of the natural history of BD, note that there is *"no evidence that the course of bipolar II disorder differ[s] from that of bipolar I"*. (Angst and Sellaro, 2000) They refer to the earliest modern records (Mendel, 1881) which suggests that episodes last 5-6 months on average (Q1=3-4 months; Q3=6-7months) although most modern studies suggest a shorter timeframe. They note that Keller and colleagues (1993) found the recurrence rate for mania was 48% by 1year / 81% within 5 years and 57% by 1year/91% by 5 years for those showing mixed cycling, results that were not unlike their own findings of 70% within 5 years despite *"sustained lithium prophylaxis."* (KELLER et al., 1993) Further, Angst and Sellaro quote Pilcz (1901) to suggest that untreated individuals exhibited *"residual symptoms after recovery from episodes. Their state was described as "unsteady, moody, irritable, indolent, egocentric" ..."*. However they did not provide any timebased graphics showing episodes but rather showed syndrome proportions and cycle length analysis. Likewise in their description of the course of manic-depressive psychosis, Bratfos and Haug do not present time-based evidence nor any graphical details, and Angst and Weis (1967) only demonstrate the distribution of age at first episode, duration of cycle and the duration of episodes.(Bratfos and Haug, 1968, Angst and Weis, 1967)

Post, Roy-Byrne and Uhde (1988) however present times series data relating to the median values of 82 bipolar patients covering 40years, showing depression below the x axis and mania above it. ( Figure 2, Reprinted with permission from the American Journal of Psychiatry, (Copyright ©1988). American Psychiatric Association. (Post et al., 1988)).

### **(2) Daily presentation**

Three years earlier, Roy-Byrne, Post, Uhde and other colleagues (1985) had demonstrated graphically the complexity of bipolar changes over the shorter timeframe of one year. (Figure 3, reproduced by kind permission of John Wiley and Sons). This collates the daily changes in the bipolar state of four patients, with time on the x axis, mania as a positive integer on the y axis and depression as a negative integer. Initiation of different therapies is shown above each timeline.(Roy-Byrne et al., 1985)

**Figure 2: (Post et al., 1988) showing Figure 3: Median Course of Affective Illness in 82 Manic-Depressive Patients.**

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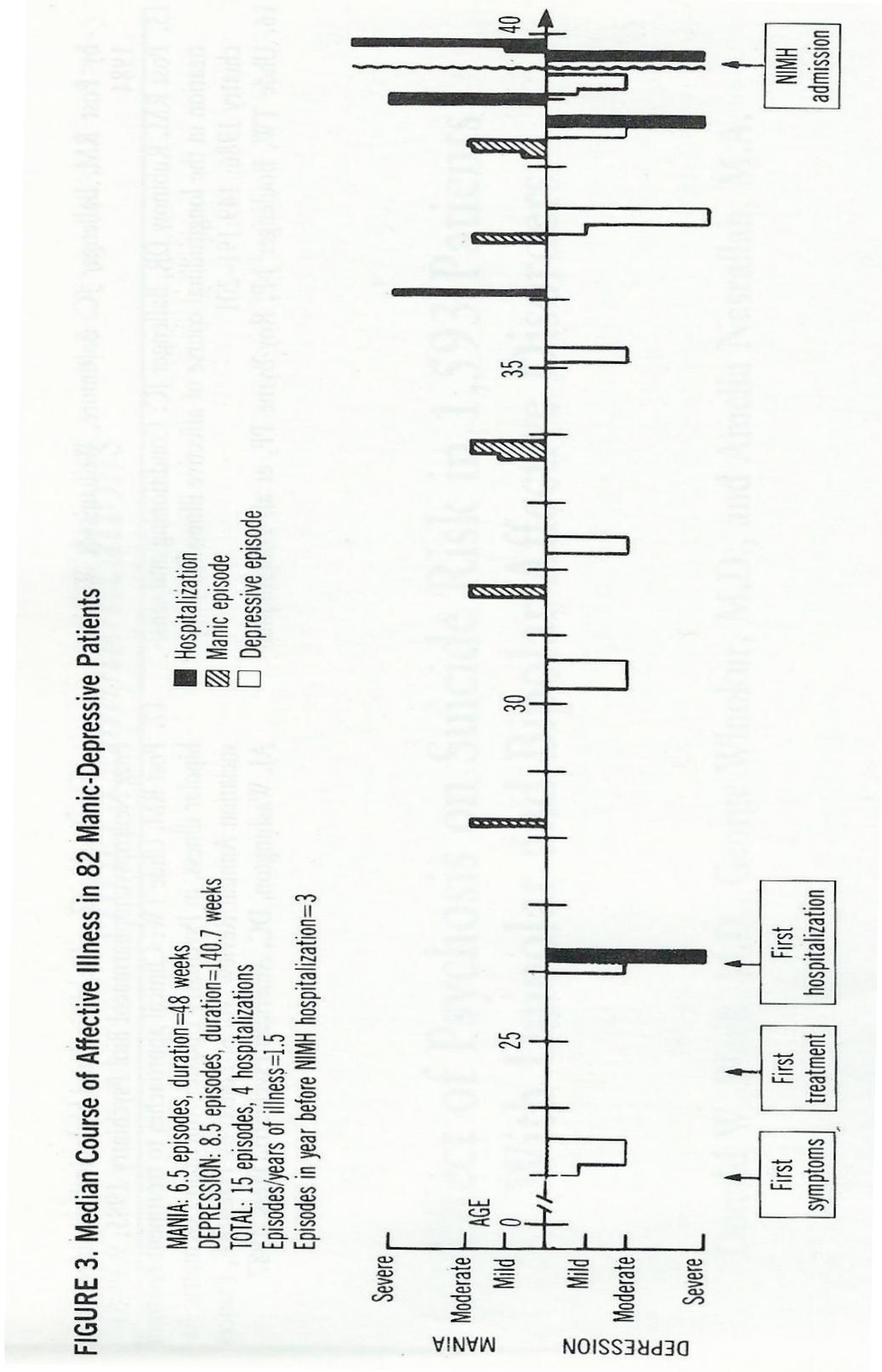
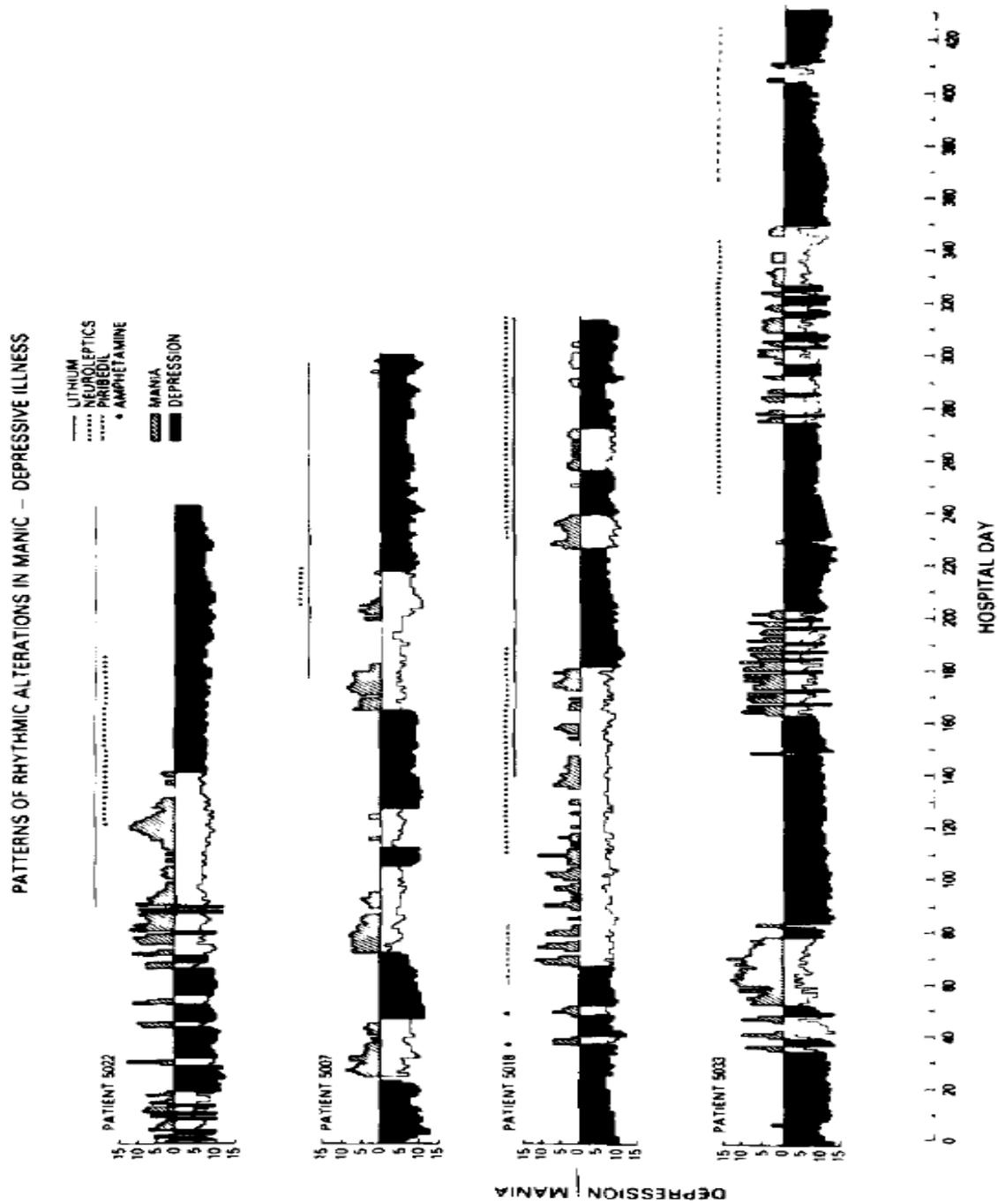


FIGURE 3: (Roy-Byrne et al., 1985) showing Figure 3: Patterns of Rhythmic Alterations in Manic-Depressive Illness.

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### ***Behavioural Characteristics of bipolar***

A summary of Gelder's description of high periods, termed mania or hypomania depending on severity, lists mood changes such as euphoria; behaviour changes such as increased distractibility, activity, appetite and libido, decreased sleep, socially inappropriate behaviour; thinking and speech changes ranging from flight of ideas and expansive ideas to grandiose delusions and hallucinations, and impaired insight i.e. psychosis.

Likewise low periods, termed depression, are typically associated with a sad appearance often with psychomotor retardation (poverty of movement); low mood e.g. unhappiness with diurnal variation, anxiety, irritability, agitation; lack of interest and enjoyment e.g. reduced energy, poor concentration, subjective poor memory; depressive thinking e.g. pessimistic and guilty thoughts, ideas of personal failure, hopelessness, suicidal ideation, self blame, hypochondriacal ideas, and biological symptoms e.g. early wakening and sleep disturbance, weight loss, reduced appetite and libido. (Gelder, 2005) The study also makes particular note of the agitation sometimes seen during depression and which is associated with an increased risk of suicide. (Day, 1999), (Akiskal et al., 2005)

### ***Emotional features***

The importance of emotional change in bipolar disorder has long been recognised:

*the fundamental emotions [joy, anger and fear] which in health are accompanied by the greatest amount of motor and mental excitement ... when due to disease [states of fear] are classed under melancholia; ...states of joy and anger... are classed under mania...*

(Robertson, 1890)

Specific investigation into the role of anger in bipolar disorder, an association with mental illness that dates from Lucius Seneca (4BC–AD65), shows that the anger attacks are not only a feature of mania but also of depression. (Novaco, 2010, Mammen et al., 2004) Unreasonable fear and excessive anxiety are recognised features of depression with bipolar individuals in this phase being "*prone to change their minds readily; to become base, mean spirited, illiberal.*" (Goodwin and Jamison, 2007)loc2718. However this should not exclude the traditional picture of depression so succinctly described by Mayer-Gross and colleagues: "*the silent shedding of tears ... in an otherwise expressionless face*". (Mayer-Gross et al., 1969)p208.

This contrasts with the euphoria of hypomania which Kraepelin described as a

*mood ... predominantly exalted and cheerful, influenced by the feeling of heightened capacity for work. The patient is in imperturbable good temper, sure of success, "courageous", feels happy and merry, not rarely overflowing*

so.... On the other hand there often exists a great emotional irritability. The patient is dissatisfied, intolerant, fault-finding... he becomes pretentious, positive, regardless, impertinent and even rough, when he comes up against opposition to his wishes and inclinations; trifling external occasions may bring about extremely violent outbursts of rage.

(Kraepelin, 1921)loc 1118

### **Changes in Circadian rhythm**

Other signature characteristics of bipolar presentation include changes in circadian rhythm - the sleep/wake cycle - which "*may represent enduring (trait) characteristics of BPD patients even during clinical recovery*" (Salvatore et al., 2008) and which are considered to be "*causally involved in bipolar disorder*". (Murray and Harvey, 2010) Further, investigation by Boivin and colleagues has demonstrated a relationship between mood and the internal clock i.e. the importance in the timing of both sleep and wakefulness within the 24 hour time frame. (Boivin et al., 1997) Additionally, "*sleep changes... especially those of more than 3h, may indicate that a large mood change is imminent*". (Bauer et al., 2006)

### **Impaired perception**

"*Impaired perception of facial emotion*", in particular to those showing fear or disgust may contribute to "*aberrant interpersonal interactions*" during mania. (Lembke and Ketter, 2002)

### **Changes in sexual arousal**

Jelliffe (1931) noted that sexual arousal is a common feature of mania, a feature first recognised by Aretaeus of Cappadocia (150 AD) who wrote of "*lewdness and shamelessness*". **both** cited in (Goodwin and Jamison, 2007). Kraepelin also recorded that such behaviour "*lead[s] to hasty engagements, marriages by the newspaper, improper love adventures....*" (Kraepelin, 1921)loc 593.

### **Impulsivity, Distractibility and Volatility**

Impulsivity and its attendant consequences are also well attested in bipolar disorder although not associated with severity of criminal behaviour as "*this is consistent with more premeditation in the more severe crimes*". (Swann et al., 2010) However, this takes no account for the display of "*greater rates of anger and aggressive behaviours, especially during acute and psychotic episodes*". (Ballester et al., 2012) Likewise, distractibility is a recognised symptom that is found not only in hypomania/mania but also in agitated depression. (Goodwin and Jamison, 2007)

Taking all these elements together – changes in emotional features, circadian rhythm, impaired perception, sexual arousal, and all compounded by impulsivity and distractibility – the diagnostic criteria for bipolar disorder and its literature describe patterns of behaviour that are essentially volatile and unpredictable. Volatility is a term used frequently in the literature relating to bipolar disorder, although without formal scientific evaluation or definition. (Goodwin and Jamison, 2007, Murray and Harvey, 2010) However it seems to embody a higher level concept that encompasses impulsivity and distractibility.

### **2.3.5 Period Characteristics**

The investigation has paid particular attention to the bipolar period characteristics as these will be compared with the study findings. These are presented under the following headings:

- **Period stages**
- **Period Onset**
- **Intra-period diagnostic stability**
- **Period duration** - its characteristics & that of inter-period duration (well interval)

#### ***Period stages***

Goodwin and Jamison (Goodwin and Jamison, 2007) describe in detail the pattern of staged changes in bipolar periods, although this progress is not an inevitable continuum and may stop or revert at any point. To summarize, in the development of high periods where mild hypomania evolves into delirious psychotic, stage 1 starts with increased activity, euphoria, expansive thinking and often a self recognition that they are "going high". Together, this can be regarded as hypomania. Stage 2 demonstrates rapid speech, flight of ideas and chaotic thinking, and where persistent preoccupations may lead to either grandiose or paranoid delusions. In addition there is lability of mood, with anger and irritability that is often explosive. This is acute mania and may be followed by Stage 3, or acute psychosis. This features florid symptoms such as severe panic and terror, disorientation in time, place and person, and a delirium-like state. However, and of particular relevance to this study, Carlson and Goodwin showed that, rather than showing these staged thresholds, "*psychomotor activity escalated continuously through all three stages*" perhaps indicating that these are more a consequence of categorization rather than disease development. (Carlson and Goodwin, 1973)

Progression in depression from mild symptoms into acute delusional depressive psychotic state and attempted suicide is equally recognized although not formally described in

stages. This may reflect the complexity of its clinical presentation as, in the words of Kraepelin: "*[o]nly too often the patients know how to conceal their suicidal intentions behind an apparently cheerful behaviour and then carefully prepare for the execution of their intention at a suitable moment.*" (Kraepelin, 1921)loc 1731. Clinically, this has led to the use of the term: the smiling depressive. (Labeaune, 2014)

Akiskal offers an explanation of mixed states - where symptoms of both mania and depression appear together - by proposing that "*temperament and episodes are opposite in polarity - that is mania arising from a depressive temperament [and vice versa]*" (Akiskal, 1992) Nevertheless, as shown by the meta-analysis of Hawton and colleagues, the concept of the agitated depressive is important, not least for its predisposition to suicide and attempted suicide. (Hawton et al., 2005)

### ***Period Onset***

The ICD-10 guidelines speak of a switch from one mental state to another, whether from normal to abnormal (unipolar change) or from abnormal to abnormal directly (swing), and which implies a rapid process. (ICD-10, 2010, Goodwin and Jamison, 2007) While this is readily apparent in the onset of mania, Goodwin and Jamison noted that initially the onset of depression was considered to be of gradual onset, as shown in the 85% of 33 study subjects by Winokur and colleagues (1969). ***cited in*** (Goodwin and Jamison, 2007) However this view was subsequently changed by Winokur (1976), Molnar and colleagues (1988) and Keitner and colleagues (1996) who suggested that "*bipolar depressive episodes are more abrupt in onset than unipolar depressive episodes*". (Winokur, 1976, Molnar et al., 1988, Keitner et al., 1996, Goodwin and Jamison, 2007)

In more global terms, Akiskal writes of "*mood lability - with rapid shifts.*"(Akiskal, 2005); Symonds notes that its speed of onset has practical implications "*essential to the proper management of bipolar disorder*" (Symonds, 2006) and Bauer and colleagues attest to its association with sleep disturbance, showing that "*sleep changes of >3h are late prodromal signs and imply that a mood change is imminent.*" (Bauer et al., 2006) The association of sleep disturbance with bipolar disorder is discussed further in Section 2.1.9.

### ***Intra-period diagnostic stability***

Once triggered, Cassidy and colleagues have proposed an intra-period "*diagnostic stability over time*", as illustrated in such parameters as "*severity of mania, hedonic [hedonistic] activation and irritable aggression.*" (Cassidy et al., 2001) This finding is supported by Beigel and Murphy,

and confirms Kraepelin's observations that each patient exhibited a constancy of presentation when similar periods were compared. (Beigel and Murphy, 1971, Kraepelin, 1921)loc 2639.

### ***Period Duration***

The ICD-10 diagnostic guidelines for bipolar disorder provide boundaries of  $\geq 4$  days for mania and  $\geq 14$  days for depression. Period duration however is not the same as cycle length which measures the time from the start of one period to the start of the next and in so doing, is a summation of period duration and inter-period duration (well intervals), when behaviour and mood have reverted to so-called normal. (Goodwin and Jamison, 2007)

#### **(1) Characteristics of period duration**

Kraepelin suggested that there was "*multiplicity of the courses taken by manic-depressive insanity*" (Kraepelin, 1921)loc2806 and this is perhaps no better illustrated than in the variability revealed when characterising period duration.

Following the advent of effective pharmacological interventions, the duration of periods appears to have diminished with Eaton and colleagues finding a median of 8-12weeks compared to Kraepelin's range of 6 to 8 months (although this included unipolar patients whose cycles are longer). (Eaton et al., 1997, Kraepelin, 1921)loc 2650, (Goodwin and Jamison, 2007). Perhaps more typical of the literature is the work of Angst and Preisig who, in their 26 year prospective study, demonstrated a mean episode length of 4.3 months where bipolar changes of either type (high or low) were 3 months but mixed episodes were longer at an average of 4.2 months. (Angst and Preisig, 1995, Goodwin and Jamison, 2007)

However, in presenting the mean or average result, such disparity may be in part statistical as data from Wertham and confirmed by Angst and Weis noted that the distribution of period duration demonstrates a log normal distribution. (Wertham, 1929, Angst and Weis, 1967, Angst and Sellaro, 2000) This statistical anomaly may partly explain Kraepelin's (1913) view that "*stressed the great variability in episode length*" ; Rennie's findings (1942) of the lengthening of repeated manic episodes and Kinkelin's opinion (1954) who found "*no systematic change in episode length between the first and seventh episodes... before conclud[ing] that later episodes tended to be longer.*" (Rennie, 1942), others cited in (Angst and Sellaro, 2000) Confusion in terminology may also contribute to these incongruities as

*[v]ariation in cycle length reflects primarily variation in the length of the symptom-free interval, because the duration of episodes tends to be relatively constant in a given individual*

(Goodwin and Jamison, 2007)p128

In addition, Slater (1938), whose original work was translated and confirmed by Oepen and colleagues, noted that patients with more episodes tend to have shorter cycle lengths and vice versa, and if this is not corrected for, has the effect of showing a decrease in cycle length over time. (Oepen et al., 2004) This has been termed *Slater's fallacy* and recent re-evaluation and re-interpretation of previously published data has shown that the *"average episode duration remains stable throughout the illness."*(Goodwin and Jamison, 2007)

Finally Kraepelin's observation, that bipolar disorder *"tends to decline after the fourth decade"* appears to suggest an age-related attenuation or burnout. (Goodwin and Jamison, 2007) However neither the works of Angst, whose study spanned 17-21years and into the seventh decade, nor that of Goldberg and Harrow, support this idea. (Angst, 1986, Goldberg and Harrow, 1994)

## **(2) Characteristics of inter-period duration (well interval)**

Kraepelin also described an apparent decrease in the duration of the well interval with increasing numbers of episodes. (Kraepelin, 1921)loc 2679. Investigations of the well interval using Slater's correction have shown conflicting evidence with studies by Bratfos and Haug, and Angst and colleagues demonstrating *"no consistent evidence of progressive shortening of well intervals"*. (Bratfos and Haug, 1968, Angst et al., 1973) Other studies such as those of Roy-Byrne and colleagues, and Goldberg and Harrow have proposed that there is a *"sensitization" or "kindling" pattern... in about half of patients* with progressive shortening of well intervals. (Roy-Byrne et al., 1985, Goldberg and Harrow, 1994) However Post and colleagues (1990) have suggested that these individuals represent a subgroup who also respond poorly to lithium but better to anticonvulsants and who show " other "non-classical" features of the illness." (Post, 1990)

### **2.3.6 IQ, Personality, Creativity & Leadership**

As a mood (affective) disorder, in contradistinction to a thinking (cognitive) disorder such as schizophrenia, individuals with bipolar disorder often have a normal adult lifestyle and responsibilities that are disrupted intermittently, and sometimes catastrophically, by their illness. (MIND, 2013) This clinical observation is underpinned by evidence from IQ assessment, where a lower IQ is a recognized association of schizophrenia, severe depression and other non-affective psychoses, but not for bipolar disorder. (Sorensen et al., 2012)

Bagby and Ryder noted the debate over the significance of premorbid personality in BD or whether BD changes personality and acknowledged that there are few studies which

compare bipolar with normal individuals. (Bagby and Ryder 2000) Of these, and using the Five Factor Model of Personality, they suggested that the traits of euthymic bipolar individuals are within the normal range for extraversion, openness and agreeableness but score significantly higher for neuroticism and significantly lower for conscientiousness. Bagby and Ryder also reviewed the Psychobiological Model of Temperament, with its four alternative temperaments (harm avoidance, novelty seeking, reward dependence and persistence), and which are considered to be both "*inheritable and linked to monoaminergic activity*". In addition, Osher and colleagues reported that euthymic bipolar individuals scored significantly higher than normal individuals on the harm avoidance and reward dependence scales but lower on the persistence scale. (OSHER et al., 1996) Taken together, these suggest that BD individuals are more likely to exhibit neuroticism, harm avoidance and reward dependence and less likely to show conscientiousness and persistence.

Regarding creativity, Goodwin and Jamison suggested that

*[t]he notion of a relationship between creativity and extremes in mood states is an ancient one ...."Madness... comes as the gift of heaven by which we receive the greatest blessings" (Socrates)...*

(Goodwin and Jamison, 2007)loc12526

It is an idea that continues to intrigue the general public today with Kraepelin (1921) best describing the resultant tension by saying:

*.. brilliant, but unevenly gifted personalities with artistic inclinations. They charm us by their intellectual mobility, their versatility, their wealth of ideas, their ready accessibility and their delight in adventure... But at the same time they put us in an uncomfortable state of surprise by a certain restlessness, talkativeness... capricious temper and suggestibility, lack of reliability.... a tendency to building castles in the air... periods of causeless depression or anxiety...*

(Kraepelin, 1921)loc 2520

And perhaps our fascination also acknowledges the wider benefits to society. Myerson and Boyle quote Bumke (1877-1950, German psychiatrist) who said:

*If we could extinguish the sufferers from manic-depressive psychosis from the world, we would at the same time deprive ourselves of an immeasurable amount of the accomplished and good, of colour and warmth, of spirit and freshness.*

(Myerson and Boyle, 1941)

Yet, against this must be counterbalanced the evidence from the individual level and summarized succinctly by Goodwin and Jamison:

*a disproportionate number of eminent writers and artists have suffered from bipolar spectrum disorders and [that,] under some circumstances, creativity can*

*be facilitated by such disorders. Indeed, great creative accomplishment is by definition a rare merging of temperament, intellect, imagination, happenstance, energy and discipline.*

(Goodwin and Jamison, 2007) loc12609

Kyaga and colleagues (2015) also noted that the general belief of an association of bipolar disorder with leadership and political eminence is also of longstanding, and quote Aristotle:

*Why is it that all those who have become eminent in philosophy or politics or poetry or the arts are clearly melancholics and some of them to such an extent as to be affected by diseases caused by black bile?..*

*cited by (Kyaga et al., 2015)*

Their population study (n=1,126,519) with 68,915 bipolar patients and their healthy siblings however carries a mixed message showing that the *"traits associated with bipolar disorder are beneficial for leadership, while the actual disorder is detrimental"* and that the effect was attenuated by IQ.

### **2.3.7 Co-morbidities & triggers**

Many precipitating factors and co-morbidities are recognized for BD. This study particularly notes the association with alcohol misuse (2010); violence (Yoon et al., 2012); life events (Alloy et al., 2005) and seasonal variation associated with changing sunlight (Bauer et al., 2012)

- **Association with alcohol**

The issues surrounding the relationship of bipolar disorder with alcohol are not straightforward, not least in the difficulty of obtaining reliable data. Patients frequently self medicate to mitigate symptoms and as such, alcohol has a well recognized role in all mental illness. Edgar Allan Poe wrote:

*I became insane, with long periods of horrible sanity. During these fits of absolute unconsciousness I drank, God only knows how much or how long. As a matter of course, my enemies referred the insanity to the drink, rather than the drink to the insanity*

(Patterson, 1992)

Equally, although many drink regularly to achieve relief, most are not dependent on alcohol: Kraepelin observed only an occasional association between mania and *delirium tremens*. (Kraepelin, 1921)loc3356. However Raimo and Schuckit (1998) have identified an interrelationship between alcoholism and bipolar disorder to show that *"alcoholics have a 3% risk for bipolar disorder compared to a 1% risk in the general population"* and the likelihood *"that the relationship between alcohol dependence and independent bipolar disorder is small, but real"*. (Raimo and Schuckit, 1998) Further, dependency on alcohol is *" associated with a*

worse outcome and refractoriness to treatment of the mood disorder [bipolar disorder]" with changes in the diurnal rhythm of serotonin (5-hydroxytryptamine) thought to be part of its biochemical mechanism.(Nery et al., 2010, PIETRASZEK et al., 1991) "*The highest prevalence of self-medication "was seen in bipolar I patients (41%)" with men " twice as likely as women to engage in self-medication."* (Bolton et al., 2009) Goodwin and Jamison note that "*increased alcohol consumption is as or more common with hypomania, mania, and mixed or transitional states.*" (Goodwin and Jamison, 2007)p229. However literature that might support the concept that excess alcohol triggers a switch from mania to depression has remained elusive, despite its undoubted neuro-depressive effects. Reversing the context, alcohol in small quantities disinhibits higher level behaviour and may exaggerate bipolar mood changes while depressive symptoms may follow the ingestion of large quantities. It is postulated that the mechanism by which alcohol achieves this is in part due to alterations in the quantity and quality of sleep. (Goodwin and Jamison, 2007)loc 5048.

- **Association with violence**

Public awareness and use of the term *homicidal mania* can be dated to the early twentieth century.(Eigen, 2010) Ballester and colleagues describe the "*greater rates of anger and aggressive behaviours, especially during acute and psychotic episodes*" even if Swann and colleagues note that impulsivity is not associated with the severity of criminal behaviour. (Ballester et al., 2012, Swann et al., 2010) Yoon and colleagues (2012), in their 22 year study, showed that although homicide in mania is rare, the total rate of offending, ranging from battery to homicide, was greater during mania than depression (86.8% vs. 13.2%). Victims were more likely to be family members than strangers (63.9% vs. 36.1%). They noted that homicide in mania was driven by impulsivity and concurred with Swartz in recognising the aggravating influence of alcohol on violence during severe mental illness. (Yoon et al., 2012, Swartz et al., 1998) Cantanesi and colleagues have also shown that sharp weapons were most frequently associated with impulsive actions, in contradistinction to asphyxia (depression) or blunt trauma (organic disorders). (Catanesi et al., 2011)

- **Association with life events**

Likewise patients with mania frequently create life crisis by their choices and actions while external crises can lead to alteration of sleep patterns and provoke mania. Jackson and colleagues showed that the "*most common prodrome [for mania] is sleep disturbance which had prevalence of 77percent...*" (Jackson et al., 2003) Thus for example, losing sleep by flying from New York to London may precipitate mania. Equally, life events such as bereavement

may be associated with *"a substantial burden of co-morbid grief related illness and impairment"* and an increased risk of suicide. (Simon et al., 2005)

- **Association with seasonal variation**

Nearly seventy years ago, Slater (1938) noted that bipolar disorder exhibits seasonal variability, where *"recurrences are significantly more likely to occur at the same time of year than at random"*. cited by (Goodwin and Jamison, 2007)loc 21931 Patterns of recurrence appear to be individual and so are less easily demonstrated in multi-subject studies. In addition, the pre-1984 literature is confounded by Seasonal Affective Disorder (SAD) whose criteria were published by Rosenthal and colleagues in that year.(Rosenthal et al., 1984) Investigations that post date 1984 show a substantial increase in the incidence of depressive episodes during spring and a smaller autumn rise with comparable changes in the pattern of suicides, perhaps on the basis of the speed of change in daylight hours.(Eastwood and Peter, 1988) Mania is also more common in springtime but mixed episodes predominate in later summer (Cassidy and Carroll, 2002) There is also a strong correlation between admissions for mania, monthly sunshine (hrs) and day length but not ambient temperature. (Myers and Davies, 1978, Carney et al., 1988) However this was not demonstrable in England by Hunt and colleagues, perhaps on account of its maritime and variable weather.(Hunt et al., 1992) More recently, and taking the issue to a larger scale, Ivanovic-Zivic and colleagues have shown that *"there is a significant negative association between the rate of hospital admissions due to depressive disorders and solar activity"* (as indicated by sunspot levels) although increases in admissions for *"mania did not reach statistical significance."*(Ivanovic-Zivic et al., 2010)

### **2.3.8 Differential diagnosis**

Given the characteristic nature of the periodicity of bipolar disorder, the differential diagnosis is brief.

Following the recognition of Attention Deficit and Hyperactivity Disorder in children, interest has grown as to whether this condition is linked to bipolar, given their similar clinical presentations. Recent work by Skirrow and colleagues confirms the established view of Kent and Craddock who state that *"adults with ADHD clearly do not have episodic inattention and impulsivity, demonstrating for adults certainly, ADHD and BP do display different course profiles"*. (Skirrow et al., 2012, Kent and Craddock, 2003)

Impulsivity is also a feature of Impulse-Control disorder (ICD) where the individual has issues with *"self control of emotions and behaviors [sic]"*.(DSM-5, 2013)p461. However,

although ICD is episodic in presentation, it lacks the elements that constitute periodicity such as the consistency of period length.

Organic pathology may also give rise to neuropsychiatric presentations. Although hyperthyroidism is classically linked with mania, its association with hypothyroidism has also been reported.(Suresh et al., 1999, Keshavean and Kaneko, 2013) However, it is unlikely that this type of secondary mania would demonstrate periodicity.(Keshavean and Kaneko, 2013)

### **2.3.9 Prognosis**

There is a substantial literature describing the incidence and risks of suicide and parasuicide, along with those concerning modern pharmaceutical interventions and behavioural therapies which are acknowledged but not deemed relevant to this study. However, current practice recognizes the degree of physical stress invoked during high periods as illustrated by Kapczinski and colleagues.(Kapczinski et al., 2011) They have drawn attention to the elevation of peripheral biomarkers relating to oxidative stress, inflammation and neurotrophins that occur during acute episodes of bipolar disorder and which are numerically comparable to levels seen in sepsis. In summary, they cite Simon and colleagues (2006); Cacilhas and colleagues (2009) and Angst and colleagues (2002) to say: *"This mechanism may also help link the accelerated aging, functional impairment, cognitive dysfunction, and premature mortality seen in bipolar disorder."* (Simon et al., 2006, Cacilhas et al., 2009)

### **2.3.10 Comparative Methodologies in Historical psychiatry**

Finally, a review of comparative methodologies from other examples of historical psychiatry shows that Garrard and colleagues investigated linguistic biomarkers of Hubris syndrome using analysis of complexity based on Information theory. The study used Entropy (H) and mean values; analysis of statistical correlations (N-gram trends) between the frequency of word sequences and the duration of time in political office using Pearson's correlation coefficient, and analysis of "keyness" where " [a] keyword is one that occurs with a proportional frequency that is significantly higher or lower (using the log-likelihood statistic) in the index sample than in the reference sample". Analyses of variance (ANOVAs) were also reported although the parametric distribution of the data does not appear to have been confirmed Garrard and Peter used a computer based diagnostic platform ([www.SimulConsult.com](http://www.SimulConsult.com)) to review the diaries of Augustus d'Este, grandson of George III in order to *"make credible, evidence-based conjectures about the nature of medical illnesses from the remote past"*. (Garrard and Peters, 2012)

Peters and Wilkinson reviewed the claims of Macalpine and Hunter that George III suffered from porphyria. Both studies were based on a descriptive analysis of symptomatology. (Macalpine and Hunter, 1966, Peters and Wilkinson, 2010) In the same publication, Peters and Beveridge made a new psychiatric re-assessment of King George III based on a similar descriptive analysis of symptoms. They applied DSM-IV and ICD-10 criteria, and presented a time line of illness before concluding that the king *"suffered from recurrent mania (four episodes) with chronic mania and possibly a degree of fatuity during the last decade of his life."* They also noted that his *"illnesses occurred concurrently with significant historical events"*, perhaps inferring that their temporal relationship was not accidental. (Peters and Wilkinson, 2010)

### **2.3.11 Summary**

Evidence for the existence of bipolar disorder spans nearly two millennia. At the time of King John, there was both public recognition of madness and medical awareness of mania and depression. Descriptions of the distinctive behavioural characteristics, the period stages, and the co-morbidities and triggers of bipolar disorder are relevant when considering contemporaneous historical accounts. The global issues of personality, IQ and creativity will also have resonance. Specific characteristics of bipolar periods such as the constancy of period duration; the diagnostic stability within periods; its abrupt onset; its relationship with sleep disturbance, and its recurrence irrespective of age, will guide the investigation and analysis of King John's itinerary. It is likely that the data will be non-parametric. Genetic studies have shed light on familial associations, which is of relevance when considering familial and non familial comparators.

## **2.4 Travel time, Itineraries & Medieval travel**

This section reviews the literature concerning

### **2.4.1 Travel time**

### **2.4.2 King John's itinerary and possible comparators**

### **2.4.3 Medieval travel**

#### **2.4.1. Travel Time**

##### ***Modelling and distribution***

The mathematical modelling of travel has a substantial and diverse academic literature. Examples include "*Lévy-type processes [that] have been pointed out as relevant in large-scale animal movements*" (Bartumeus, 2007) and show "*a surprising accuracy*" to "*human travelling behaviour*" (Brockmann et al., 2006); "*K-means clustering, decision trees and neural networks*" that have been used to predict travel time (Li and Chen, 2014); and the gravity model which presumes that trips produced at an origin are attracted to a destination. (Lowe and Sen, 1996, Duffus et al., 1987, Abdel-Aal and Moghazy, 2014) However, none of these models relate travelling to time as presented by King John's itinerary and which is, in essence, a mathematical time series.

The identification of the distribution of any data set is the mathematical equivalent to identifying the language of an ancient text in order to use the appropriate grammar and word-list to construct an accurate translation. The investigation therefore notes the literature mentioning the distribution of travel time such as those suggesting that "*log-normal appropriately describes the distribution of link travel time*" , (EL-Faouzi and Maurin, 2007) that travel time may be modelled using the Burr distribution (Taylor, 2012) or that it is found to have either log-normal or normal distribution. (Abdel-Aal and Moghazy, 2014)

##### ***Measuring distance***

A review of the "[m]athematical models of road travel distance", using goodness-of-fit criterion, suggests that rectangular distance function "*does not compare well against the alternatives*", that "*the Euclidean metric is preferable to  $d_1$  [rectangular] on the basis of accuracy and convenience*" and that elliptical function "*proves to be relatively accurate.*" (Love and Morris, 1979) Rectangular distances can be likened to grid distances, while Euclidean

equates to "as the crow flies" and elliptical distance is a variant of the Great Circles (Haversine formula,(Wesolowsky and Love, 1971)) All methods are acknowledged to have a systematic error.

In their seminal work Cole and King demonstrated the constancy of the ratio between the actual distance and the Euclidean distance in rural areas in various parts of Britain, finding that the actual distance is a factor of X1.2–1.6 times the Euclidean distance. (Cole and King, 1968) More recently, Tanser and colleagues have introduced the concept of "*impedance (the friction of distance)*" [which] *can be represented by Euclidean distance, distance along a road network, travel time or travel cost.*" They note that "*Euclidean distance is therefore almost always used as a proxy measure of accessibility in rural African settings...*", reaffirming its validity in pre-modern environments. (Tanser et al., 2006)

The study also notes that Google Inc does not publish the precise mathematical model by which it calculates distance.

### ***Measuring time***

The preface to the itinerary of Richard I records an example of two dated charters issued by Richard in Westminster and Canterbury on sequential dates, with the distance between them given as 62 miles. The same seven witnesses are recorded against both documents. It continues:

*Richard and these companions could have made the journey in one day but it would have occupied some ten hours' actual riding with a halt for food and changing horses. ... Other instances can be found where it is impossible that the strict meaning of the clause can be accepted. ... Some charters are so long that the mere writing of them would have occupied the greater part of the day.*

(Landon, 1935)pp ix, x.

However this does not consider whether charters or similar public documents were written in advance by the applicant and proffered to the king for his consent and seal, or, admittedly less likely, if Richard appended his seal on partially completed documents. This investigation also assumes that any differences in practice between Richard and John in these matters were minor.

Perhaps more importantly however, all the literature explored by this study assumes that the arithmetic difference in dates is equivalent to the travel time. For example when the itinerary notes a change of location between the 15th to the 16th, this is held to be a travel time of one day or approximately 8hours. However this makes no allowance for the king issuing documents before leaving on the morning of the 15th and issuing documents after his

arrival on the evening of the 16th, and thus giving an effective travel time of two days, or 16hours. And in the case cited above, this would equate to 31miles/day which is entirely plausible on horseback.(Johnson, 1978)p37. This is discussed further in Chapter 3: Travel time moderation.

## ***2.4.2 The itineraries of King John, his family and his contemporaries***

### ***The Influence of the Sources***

Although TD Hardy reconstructed King John's itinerary from multiple original sources such as official court documents or records of legal cases, or from original documents Hardy personally accessed, he provides no detail of documents per itinerary entry (Hardy ,1835a) Although this may be regarded as a potential influence on the interpretation of the study findings, it only requires one source to indentify King John's location on any one date, even if more than one identification provides additional validity.

A second uncertainty arises from the existence of documents after 600years to the time of TD Hardy and the potential for the patterns of their survival to confound the interpretation of any patterns in the study findings.

A third cause of potential error arises from the medieval practice of enrolment where court clerks copied from original documentation onto a roll of vellum (enrolled) to create the court records. As with any duplication, these medieval equivalents of carbon copies may introduce clerical errors.

The rolls were also catalogued according to purpose, a development that matched the evolving roles within the king's court. For example, the roles of treasurer and chamberlain were held by one person at the time of the Conquest but began to evolve into two offices during the reign of Henry II.(Tout, 1920)p10, 82. By the time of King John, and during his reign, specialisation in written rolls and of court roles led to a growth in organisation which Carpenter describes in terms of a "*government that was document driven*" and where "*the thirteenth century stands as a peak between the valleys of the twelfth and fourteenth centuries either side.*" (Carpenter, 2004)p49. This could amount to a fourth confounding influence as the historical loss of one roll meant the loss of a collation of specific documents. The development, function and names of the rolls are described below.

The Anglo-Norman kings "*created an exchequer in England that each year produced a record called the **Pipe Roll***" with "*[t]he first extant example from 1130 reveal[ing] sophisticated accounting techniques unparalleled in western Europe*" and which compares poorly to King

Philip who established the French equivalent in 1190. (Baldwin, 1986) p420 The English exchequer presided over a system that addressed the key issues of what was owed to the crown by its subjects, what had been paid to the crown and the remaining debts that should be carried forward into the next accounting year. However it is unlikely that such a process was invented in 1130 but rather that it evolved in response to circumstances, need, and the interest and interests of successive monarchs. This is evidenced by the *Dialogus de Scaccario* which was written by Richard fitzNeal, Treasurer to Henry II as a handbook of Exchequer practice and purpose, and which is still valued for "*the assistance it gives to the understanding of the pipe rolls.*" (Richardson and Sayles, 1963)p243. Equally, in a world of Roman numerals, Tout attributes the Exchequer's success to:

... the adoption of the accounting method of the abacus, worked out on the chequered cloth, which gave the exchequer its name, had now supplemented, without superseding, the more primitive method of the tallies.

(Tout, 1920) p93.

Key to the collection of dues however, was the establishment of a record system that was accurate, accepted by all parties and accessible in case of future disputes. Key to a written record system was firstly, the availability of vellum as a by-product of the wool trade that followed the establishment of the Cistercian order in England and secondly, numbers of educated staff who were both numerate and literate, a proto Civil Service. (Coppack, 1998)p12. Key to the Exchequer's survival was its ability to adapt and respond to circumstances; its success in this resulted in an unbroken sequence of annual financial accounts that are still gathered by the current Exchequer and its educated staff, and presented to the Westminster parliament as the Budget.

The Exchequer also created specialised records known as the **Liberate rolls** (outgoings from the Exchequer) which at the start of King John's reign were identical with the Close Rolls of Chancery and were subsequently superseded by them from his 6th regnal year. The liberate rolls however also accommodated two "rare series of Records [sic]" called the **Misae rolls** (daily expenses) which now exist only for the 11th and 14th regnal years and the **Praestita Rolls** (money advanced by the crown to individuals and therefore owed to the crown) for the 12th regnal year. (Hardy, 1844)pp xvi, xviii. Additional material is also found within the **King's Remembrancer** (accounting and auditing) of which the 7th regnal year has also been published. (Cole, 1844)

In addition to the **Exchequer rolls**, "*John's reign is the moment where the systematic keeping of archives in the Chancery starts.*" (Warren, 1978) p126. Once again, this is a turn of

phrase rather than an actual reality, since the Chancery or king's clerical office evolved from Saxon times and practice, with the Chancellor having responsibility for the efficient functioning of the court. (Chrimes, 1959) p12,24,25. By the time of King John, it encompassed both the day to day running of the court and matters of state and government, with the Chancery rolls not only holding copies of public letters (**Patent Rolls**); public charters (**Charter Rolls**); the **Fine rolls** (records of contributions made by individuals against their debts to the crown) but also the king's private correspondence (**Close Rolls**). (Hardy, 1835c, Hardy, 1837, Hardy, 1835b, Hardy, 1833)

Finally, Hardy might be accused of relying only on English sources to compile an itinerary that included significant continental travelling. However this can be discounted for at least King John's continental administration in Normandy, as this "*is exceptionally well documented because his [English] clerks kept copies of the voluminous royal correspondence.*" (Harper-Bill and Houts, 2002) p64, (Hardy, 1835d)

### ***TD Hardy's itinerary (1835)***

So having used any document available to him that recorded the date and place of issue when King John was present, in order to construct the most complete itinerary, TD Hardy quoted Sir Harris Nicolas (1799-1848) to write:

*The value of history materially depends on the accuracy of the dates and localities to which particular events are assigned, for an error in either necessarily affect the inferences which may be drawn from them; it has been well observed, "that dates are to history what the latitude and longitude are to navigation."*

(Hardy, 1835a)p105

Regarding the matter of King John's implied presence, Hardy writes:

*The authority for assuming the King was present in person at the several places specified in the Itinerary is derived, first, from his attestations to the charters and letters which are registered on the Patent, Charter and Close Rolls; secondly, from the record of the movements of the court exhibited in the "Rotuli Misarum" or Wardrobe Accounts, and in the Praestita Rolls; and thirdly, from the internal evidence afforded by the records printed in this volume.*

(Hardy, 1835a)p112

and, while acknowledging that clerical errors had been made during the process of registration on the Rolls, he defends the accuracy of the itinerary by saying:

*But the principal, and indeed the only objection which appears to require explanation arises from the fact, that in a very few instances two or more instruments are enrolled bearing the same date, which vary materially as to the place where they are said to have been attested. For example, where one instrument states that the king was at York, and another that he was at London,*

*on the same day. These discrepancies, however, have been found only between two enrolments, and never between two original instruments, whence it is evident that the circumstance is to be solely attributed to the carelessness of the clerk whose duty it was to register the documents on the Rolls of Chancery. ... Though errors of this kind must be admitted to exist, they do not affect the principle contended for: viz. that attestations may generally be relied upon as evidence of the king's presence at the place where his letters, etc are dated; nor do errors preclude the possibility of rectifying occasional mistakes. It would be needless to adduce arguments to prove that clerical errors are incidental to every species of documentary evidence; all that is here required is to establish that such discrepancies arise from clerical error, and can be detected.*

(Hardy, 1835a)pp117,118

However, some rolls are missing namely, the existing Patent Rolls only begin in King John's 3rd regnal year and are also lost for his 7<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> regnal year. Despite this, the itinerary has only one significant interruption, 18 May 1211 to 3 May 1212, during which only 11 entries are known. (Hardy, 1835a)p1. (The difference in dates – 18May and 3 May – is because King John's reign is traditionally counted from the day of his accession to the throne on 27 May 1199. As this was also Ascension Day, a moveable feast calculated from Easter Day, each regnal year differs in length, being measured between successive feasts, rather than the anniversary by date. (Hardy, 1835a)p110.)

Inevitably over the intervening 180 years, Hardy's itinerary has become an historical source in its own right, albeit secondary in nature, with only recent interest in its development. It made its electronic debut on the web at [neology.com/timelines/JohnItinerary.html](http://neology.com/timelines/JohnItinerary.html) (Crump, 2015) while Julie Crockford (nee Kanter) used it as the source of her analysis of King John's kingship in her thesis *Peripatetic and Sedentary Kingship: the Itineraries of the Thirteenth-century English Kings* .(Kanter, 2011) Most recently, the *Magna Carta Project* based at the University of East Anglia, has reviewed and updated the itinerary for the specific period Feb 1214 to June 1215. (Vincent, 2015)

In her thesis, Kanter investigated the itineraries of John, his son, Henry III and his grandson, Edward. Distances were determined using the shortest route by modern road using Google Maps™, and the least distance if variability was noted by mode of transport - car, bicycle or foot although "[i]n almost all instances the walking directions are the shortest". This was held to be an acceptable method because "the overwhelming majority [of distances between places] were not very far apart"; that "many roads involved in the shortest journeys between the locations in the itinerary have not change significantly since the thirteenth century" and "[m]any of the best roads of the medieval period were the old Roman roads, many of which have been incorporated into today's "A" roads". Euclidean distance was

considered but rejected as being both imprecise and impracticable, due to lack of "access to professional and sophisticated mapping software" and concern that "hand-drawn lines on maps and my own calculations" were "not a particularly accurate method". She further noted that "contemporary poetic evidence ... shows that directions (and hence distances) given "as the crow flies" were a mark of idiocy." No record days - where no historical records exist for a given date - were either assigned to a particular place on the basis of likelihood if the missing gap was three days or less and there had been no change in location, although Kanter noted that King John "is almost inevitably recorded at a different location"; the remaining dates were left blank. Location identification was recorded solely by place name and there was no identification or discussion about possible duplicates. The subsequent analysis was descriptive and, assuming a parametric distribution, used percentages and averages to describe distance per time (day/month), changes in location per time (month), and duration and place of stay. No comparative statistics were used.(Kanter, 2011)

The Magna Carta Project also renders locations by name, often giving both original and modern, includes the modern county/département and provides online maps with journey lines shown as Euclidean distance.(Vincent, 2015) Neither investigation attribute a latitude and longitude reference to locations, despite the latter generating online maps.

The findings from Kanter's version of the itinerary of King John and those from the Magna Carta Project underpin " *The Roads to Runnymede: Magna Carta and Geographical Information Systems (GIS)*" by Ellen Potter and Max Satchell as part of their "Provisional geodatabase of the itineraries of the kings of England, 1199 -1305." (Potter and Satchell, 2015) Potter and Satchell suggest that "dirt roads were the norm" while acknowledging that "the journeys of the king's baggage train, which consisted of wagons and carts, is in some ways more interesting than that of the king on horseback. Horse could go virtually anywhere...". Their preliminary analysis "for John's reign shows no relationship between hours of daylight and the distance he travelled each day." When they compared "trial mapping... using the itineraries for 1205, 1235 and 1305 (the most complete years from the reigns of John, Henry III and Edward I respectively)" this showed that "during the harshest winter months the kings geographically restricted their travel to the south east."

### ***Other itineraries***

The itinerary of Peter des Roches, Bishop of Winchester, who acted as regent of England in King John's absence in France, has been published. It starts on 20 March 1206, extends beyond

the date of King John's death, and is of sufficient detail to warrant investigation as a possible non-familial comparator of King John. (Vincent, 1994) pp.143-162. Much less complete is the itinerary of King Richard, a potential fraternal comparator, which was compiled by Lionel Landon in 1935. (Landon, 1935) It contains two periods of travelling over a similar environment of sufficient detail namely, 20 July 1189 to 7 Aug 1190 and 1 March 1194 to 6 April 1199.

The study found that other itineraries such as that of their father Henry II appeared too scant for mathematical analysis. However it notes the mathematical modelling used by TK Keefe in his paper on the *Place-Date Distribution of Royal Charters and Historical Geography of Patronage Strategies at the Court of King Henry II Plantagenet*. (Keefe, 1990) Keefe equates the terms distribution and frequency to use percentages and "distribution" [frequency] maps to illustrate his findings. He also applies a "trend test to place-dates by shortening the range of dates from 1154-89 into increasingly smaller date-ranges (1157-89; 1169-89; 1173-89)" to show that "the distribution [frequency] of charter origins either remains the same or increases for major sites." Other subsamples were used "including random samples of three per cent and ten per cent", although Keefe provides no rationale for these choices.

In addition to these personal itineraries, Church describes the specific itineraries of King John's household (*domus*) and his hunt but which appear to be as yet unpublished. Regarding the household, he notes that the "carters and sumpter [=pack or "removal"] men were often required to keep pace with the king which... could only have been achieved with considerable effort" but that they did so successfully, covering distances such as 34 miles and 25 miles on sequential days (12–13 June 1212), and 42 miles and 46 miles over a similar timeframe (16–17 June 1212). Likewise regarding the hunt itinerary, derived from information in the *Mise roll* of John's 14th regnal year (3 May 1212–22 May 1213), Church describes one group of "52 dog handlers, 167 greyhounds, 38 dogs of the pack, 32 bercelets [leash or scent hound], 9 boys and 2 senior huntsmen" and that another group had "300 greyhounds, 64 handlers, 8 bercelets and 16 boarhounds." He notes that they appear to have travelled by night on occasion and at a rate of 15 -18 miles/day. (Church, 2007) This matches Keegan's opinion that the

*very best speed to be achieved with regularity by men on foot ... was about twenty miles a day. This was true of the legions on the Roman internal lines of communication and of Von Kluck's army on the advance from Mons to Marne in the French campaign of 1914.*

(Keegan, 2004)p302

### **2.4.3 Medieval travel**

This section considers those parameters that might have influenced King John's actual travelling so as to ensure that the study data, and its subsequent interpretation, is credible.

#### ***Method of travelling***

While every fit person could walk, the horse was the preferred means of travel during this period, although mules and donkeys, which accounted for about 1% of all equines, may have been pressed into service by necessity, or by choice e.g. clergy (Clark, 2004) p 77. As a rule the king travelled with an extensive court that included his *mesnie* [the household knights] and their men at arms plus court officials, clerics and scribes, messengers and court suppliers, all of whom had attendants and associates who serviced their personal requirements. The scenes of incipient chaos accompanied by the raised voices in many accents and dialects of Henry II's court (John's father) are well described and explored by Vincent, and the same would have been expected for John's court.(Vincent, 2007)

In addition, King John appears to have let his baggage, household and hounds travel independently of him and each other, as witnessed by their itineraries.(Church, 2007) This baggage, as well as trade in goods to supply the court, were carried either by coastal shipping, by wagons Inland or by waterways and canals, especially in the catchment area of the Severn, the Thames and other easterly flowing rivers.(Edwards, 1987),(Bond, 2014) More specifically, in the 1060s the men of Torksey were required to provide boats and boatmen to carry royal messengers down the Trent and it might be assumed that such a practical duty of service continued to be provided in the time of King John.(Blair, 2014)

There was a growing preference for using horses rather than oxen, both to pull wagons or carts for trade and supply, and to act as pack-horses for local trade or in difficult environments. Wagons with two wheels (*bronnette*) were still the most common mode of transport which may explain why King John's hire of four wheeled wagons (*carrette*) or long carts was raised as a separate item of expenditure in the Pipe Rolls.(Postan, 1973)p115. When wagons were used to transport John's prisoners from Mirebeau, it provoked contemporary comment as the usual alternative to horseback was travel by litter and they were reserved for the sick, the fragile or the elderly.(Powicke, 1913)p151, (Norris, 1998)p135.

The typical medieval horse was 13.5 hands high which is more akin to the modern pony (defined as less than 14.2 hands) and considerably smaller than the modern hunter of 17 hands. This evidence is derived from archaeological assessment of the size of horseshoes

which were a medieval development to protect the hoof on hard routes and required renewal/adjustment at the blacksmiths every 6-10 weeks.(Rackham, 2004) Modern practice suggests that horses require grass rather than mixed pasture with feeds being split into 2-4 feeds per day. In addition, the modern horse is allowed to cool down after exercise and before eating, to aid digestion and avoid intestinal problems that can be fatal.(*Personal communication*) So while the medieval horse may have been more robust and less pampered, this nevertheless gives an indication of the time required for grazing, its likely frequency, and how this may have impacted on journey time. Additionally, when this was compounded by numbers, as when King John travelled with an army, "*except on extensive grasslands [cavalry] will graze out an area even more quickly*" and "*an animal train would have consumed their loads over 8 days.*"(Gaffney, 2006)p251-72; (Haldon et al., 2011-2012).

The average medieval horse had a useful life of about 16 years, being trained to draw wagons by 3, saddled by 4 and beyond service by 20 years. The burden of work can be considered in terms of time with light work being 2–3hours duration, medium work 4–5hours and heavy labour 5–8 hours.(Center, 1997) Small wonder then that the Pipe Rolls frequently record part payment to the Crown in terms of horses and that the Crown was happy to accept them, as for example Cecelia de Creuequor [sic] who owed £62, 1mark and 2 palfreys with 100s in credit, and gave the 2 palfreys along with a part payment of £27 and 1mark.(Stenton, 1948) p134.

An additional interesting comparison of King John's travelling can also be made with the well documented military campaigns of the Napoleonic period, whose larger and purpose bred horses provide this study with an upper limit of equine capability and endurance. As such, Murat's cavalry (1805 campaign) made marches of "*up to 50 kilometres per day (roughly 31.25 miles). This pace soon told on the horses.... One trumpeter said that his regiment the 8th Chasseurs resembled a walking infirmery!*" (Johnson, 1978)p37. For the Waterloo campaign AF Becke suggests that "*some of the French Reserve had to cover 60 miles by forced march in 36 hours*" while CP Escalle states that French cavalry was able to move at 4,800 to 5,000 meters (3 to 3.125 miles) per hour and infantry at 3,000 to 3,500 metres (1.9 to 2.2 miles) per hour. *cited by* (Nafziger, 1996)p291.

### **Environment**

King John lived and travelled during the postulated Medieval Warm Period which affected Northern Europe and should have made travel a little easier.(Lamb, 1965) However, this may

be an oversimplification as geographically diverse contemporaneous accounts speak of harsh winters, especially during January to March 1205 which resulted in rises in food prices. (Hughes and Diaz, 1994); (Stevenson) p151; (Luard, 1869)p393. It might therefore be implied that the seasonal condition of routes, especially at altitude and during the winter, might have been more challenging for King John than the assumption of the Medieval Warm period would have us believe. To counterbalance this influence, and despite the convention that medieval roads were "*mud in winter, dust in summer*", the medieval development and requirement for protective horseshoes would support the alternative view that many road were not just grass or mud tracks - so called green routes - but rather were strengthened and repaired by laying scalplings from quarrying (see below) and local pebbles over the track surface which the passage of traffic compacted, creating a "*chemin blanc*". (Labarge, 1982)p22; (Leighton, 1972)p38,39.

The preceding two centuries had also seen an explosion of technology, first with the water mill and then the wind mill, with such advances not being equalled until the Industrial Revolution of the 18th and 19th century.(Gies and Gies, 2010)loc1526. Having harnessed these energy sources, stone supplanted wood as the elite building material leaving an early post industrial landscape of "*hills and holes*" such as still seen at Barnack, Cambridgeshire. (Pryor, 2010) p284. And stone was not limited to the great castles and cathedrals still extant today but also used to build bridges. This established a web of transport nodal points often linking road and waterway, and since bridges were also independent of high or low water, this feature also improved communications.(Gardiner) p105.

Probably the best known example is the first stone construction across the Thames at London which was commissioned by Henry II in 1176, probably starved of funds by Richard I and completed in 1209 during the reign of King John.(Hardy, 1835a)p67. It was built as "*a habitable structure*" with the famous nursery rhyme relating to 1263 when the Queen diverted the funds for its upkeep. Despite other incidences of fire, this robust construction and inevitable traffic bottleneck was replaced by Act of Parliament (1823) with the demolition of its medieval predecessor starting in 1831 after 622 years of functional service and ending in 1921. (LondonBridge, Pierce, 2001) In contrast to bridges, fords and ferries were subject to seasonal inundation and, if near the coast, twice daily tidal changes which are often substantial. So the availability of bridges and reliable fords or ferries had considerable influence over the choice of route and the pace of travel.(Edwards, 1987, Harrison, 2004) The choice of route was also predicated on the road network which appears to have been a mixture of ancient highways,

drovers' routes, local tracks and Roman roads. (Addison, 1980), (Stenton, 1936)

And what of the landscape? This was a countryside before enclosures, where pathways "evolved" to avoid obstacles, of the open field system and of few physical barriers such as hedging, fencing or walls which were only found surrounding deer parks. ((Hindle, 1982)p36,49; (Pryor, 2010)p299; (Cox, 1905)p2; (Stevenson)p163. The contemporary understanding of the term forest was also different from our modern one:

*... a portion of territory consisting of extensive waste lands, and including a certain amount of both woodland and pasture, circumscribed by defined metes and bounds, within which the right of hunting was reserved exclusively to the king and which was subject to a special code of laws administered by local as well as central ministers*

(Cox, 1905)p2

Likewise the terms deforestation and afforestation referred only to its administration (a different legal and taxation system called the forest regulations) rather than the nature of its planting. (Cox, 1905)p2 Pryor gives a further insight in adding that by "1216 only 80 of the 143 royal forests were actually wooded" with entire towns such as Colchester located within a royal forest.(Pryor, 2010)p290. Given that by 1189, "between one third and one quarter of England was considered by the king as within the bounds of the forest administration" and that this proportion increased under King John, this perhaps explains the importance of the Charter of the Forest to contemporaries, when it was issued alongside *Magna Carta*. (Winters, 2014, Pryor, 2010)p290; (Holt, 1992)p35. In addition to this royal demesne, there were 26 large private forests for hunting (chases) and many smaller deer enclosures scattered across every county – for example, Cheshire alone had twenty-nine such enclosures.(Pryor, 2010)p291.

### ***Finding the way and keeping in touch***

Irrespective of century and in the absence of practical maps, journeying requires the input of at least some of the following: way markers, an accompanying guide or pilot, personal knowledge and/or a means of navigation.

There appears to be a widely held convention in the literature concerning medieval travel maps that starts with an account of Matthew Paris' schematic map drawn sometime around 1250.(Hindle, 1982)p30,31; (Connolly, 1999) Likewise Harvey who, referring to both portolan charts (marine navigation) and the fourteenth century Gough map suggests that

*None of the surviving portolan charts is older than about 1300, and the earliest known reference to them is in 1270. Of the regional and local maps, few of those from Italy or England are earlier than the fourteenth century and all the maps*

*known to us from France, the Low Countries and Germany date from later. ...The Gough map of Great Britain... like the portolan charts, was drawn as a guide for travel.*

(Harvey)p283, 284.

However, this generalisation is challenged Edson who has analysed manuscripts such as that held in Oxford (St John's College, MS 17 + London, British Library, MS Cotton Nero C.VII, fols. 80r–84v) and which, drawing on Anglo-Saxon writings (c.985-1020), was written in 1110. This was used to compute the exact date of Easter and also contains maps. Edson notes that

*several hundred manuscripts on the subject [calculating the date of Easter] survive from the eighth to the twelfth centuries and some of these contain world maps.*

(Edson, 1996)

Moreover, she describes four types of maps, namely the classical T-O map (Beatine map); the five zone model of Macrobius; the list map or schematic T-O map and lastly, those imitating the detailed Isidore map (late 8th century).(Edson, 1996) Equally, a Dublin manuscript (Dublin, NLI 700) of writings by Gerald of Wales (Giraldus Cambrensis, c1146-1223), who both travelled with Prince John, and wrote about and to him, contains a map of Europe. (O'Loughlin, 1999) The assumption is also challenged on the grounds of contemporaneous practical experience and personal interactions during this age of pilgrimages and crusades. Lebarge summarizes this by saying that

*By the end of the twelfth century, however, a considerable amount of practical topographical knowledge of the main countries of Europe and the Middle East had already been accumulated and was quite widely known.*

(Labarge, 1982)p1

However, if it is accepted that regular access to practical roadmaps was probably limited, this raises the practical importance of way markers, guides and personal knowledge. To my knowledge there does not appear to be any references of payment to guides or pilots by King John, either in the Pipe Rolls or other academic literature. Equally a substantial number of journeys were on roads that King John travelled over only once, making personal knowledge by King John or his regular *entourage* unlikely. (Hindle, 1982)Fig.9 This leaves the role of way markers which were features of Roman roads and, as some still exist today, may have had some relevance to travel in the twelfth century on those particular routes.(Benford, 2002)p4 Beyond these specific roads there is evidence that the concept of way markers still existed in the minds of men with the Roman practice being found on church roads in Cornwall dating from at least 1491. These were granite crosses of which "*... over a hundred of these crosses remain, though others... are represented only by field names.*"(Hindle, 1982)p8. John Ogilby's

(1600-76) first national survey of national roads makes references to existing mile-markers and his work led to the first modern marking of the newly defined mile on the Dover to Canterbury road in 1633. Wood was used as well as stone but they perished, leaving just the stone markers as an enduring legacy of the turnpike trusts (1663-1888).(Benford, 2002)p7,10 &20.

The earliest evidence describing the magnetized needle or compass, dates from King John's time when Alexander Neckam (1157-1217), Abbot of Cirencester noted in his treatise on nautical science *De Utensilibus and De naturis rerum* ( c. 1190) that it was regular practice of many seamen in the Catholic world to use a needle mounted on a pivot. (Neckham, 1863)ppxxxiv,183. This technology is also referenced by Jacques de Vitry (1160/70 –1240) Bishop of Liege (1216) who writes about the "*loadestone* [sic]" and by "*Guyot de Provins, c 1200, [who] celebrates the ability of a needle magnetized by the loadestone to point to the polar star*".(Neckham, 1863);(Johnson and Nurminen, 2007)p155.

Messengers were part of court life and the household accounts list the payments of many arriving and leaving court.(Hardy, 1844) However I cannot find any literature that addresses how they located King John on his travels, nor how they found their way to their destination when sent out from the King, nor if they had access to regular changes of horses in order to ensure a fast passage.

### **Accommodation**

Availability and choice of accommodation could have diverted the course of King John's travels. Life in a medieval castle is generally well known and described in detail by Danziger & Gillingham. (Danziger and Gillingham, 2003)pp-15-32 A less formal but no less expansive lifestyle can be reasonably assumed at the many manor houses and hunting lodges held by the crown which were clearly large enough to host significant court business, such as the hunting lodge that was used for the eponymous negotiations of the Constitutions of Clarendon(1164). (Warren, 1973)

In addition King John will also have made use of ecclesiastical establishments that had a religious duty to accommodate strangers and travellers under their monastic rules.(O'Gorman, 2008) He also had the option of staying as a guest of his barons or in en-chartered/enfranchised towns – where the landowner funded the capital outlay but which ensured a steady future income stream and the inhabitants received privileges as burgesses although were subject to higher outgoings such as rents. (Danziger and Gillingham, 2003)p53. It was a popular economic driver which Henry of Huntingdon (1088-1157) described as settlements

"glittering on the banks of fruitful and very beautiful rivers."(Danziger and Gillingham, 2003)p52 However fluctuations in King John's popularity may have influenced his choice of these options.

When none of these alternatives was suitable, the Pipe Rolls indicate that King John had access to a tent, perhaps in the style of the Romans who draped a leather sheet across a horizontal pole and borrowed the term for butterfly to call it *papilio*, the identical term used in King John's accounts.(Comitatus),(Hardy, 1844)p125. Over time this simple construction evolved into the traditional medieval pavilion beloved by Victorian artists, although I cannot find any supporting literature that describes the timeline of this development despite the probable existence of contemporary illustrations and marginal drawings.

### **Money & Expenditure**

The movement and availability of cash appears to have influenced King John's journeying: Jolliffe notes that King John travelled to collect funds from "provincial depots".(Jolliffe, 1963)p249-252. There is also a record of some of King John's structural expenditure and his personal oversight of these projects may also have influenced his choice of destination.(Brown et al., 1976)

Yet despite these issues of cash flow, King John was not miserly. He clearly enjoyed himself in order to accrue gambling losses and he paid repeatedly for the luxury of baths.(Stenton, 1948) p115,131,137 He was also renowned for his alms giving and was the instigator of the tradition of the monarch giving Maundy Money to impoverished individuals (15 April 1210): "*On the Day of the Lord's Supper in Knaresborough in Maundy [gifts] from the King to 13 paupers, [13 pence each, totalling] 14 shillings, 1 penny*". (Stenton, 1948)pp 110,111,117,120,122,124;(Hardy, 1844)p161;(Kellet, 1990).

## ***2.5 Contemporary accounts and Modern historiography***

Historical opinion of King John appears to have oscillated on a continuum between being a victim of circumstances to an agent of catastrophe for the last three hundred years. Current public perception of *Bad King John* stems mainly from the influence of historians writing between 1860 and 1920 and who relied extensively on the accounts of the Chroniclers - or as Warren put it:

*Clearly the very thought of John brought a strong stench of brimstone to the episcopal nostrils. But [Bishop] Stubbs knew the chronicles of the period thoroughly, and this is what the chronicles led him to believe.*

*(Warren, 1957)*

These chronicles form part of a substantial corpus of contemporaneous records that illuminate King John's reign so this section starts by reviewing their contribution. It continues by tracing the changing interpretation of subsequent historians in order to provide the historiographical backdrop to Dutailis' thesis.

### ***2.5.1. Contemporary accounts***

Literacy and numeracy was confined mainly to those who had received a clerical training and who often went on to join religious establishments. This circumstance introduces a potential source of bias regarding accounts of conflicts such between King and Church. Equally other sources, although not always hostile, promoted another agenda, for example **Histoire des Duc de Normandie, the Annals of St Aubin at Angers, Rigord** and **Guillaume le Breton** were writing from the continental perspective and likewise **the Scottish chroniclers** took an independent view.(Michel, 1840, Richard, 1903, Delaborde, 1885, Bower, 1994)

The clerical accounts associated with particular religious establishments are termed annals, and this investigation has reviewed those written at **Bermondsey; Burton-upon-Trent; Bury St Edmunds; Dunstable; Margam, Port Talbot, Wales; Osney near Oxford; Tewkesbury; Waverley; Winchester** and **Worcester**.(Luard, 1864, Luard, 1865, Luard, 1866, Luard, 1869) Those accounts with a sole author (or majority author) are termed chronicles, although there was no "embedded" (to use a modern journalistic equivalence) court chronicler for King John's reign, nor indeed any one court based writer that covered its entirety. Of note however, for the purposes of this investigation, are **Richard de Devizes, Roger of Howden** and **Ralph Diceto** who died in c.1200, 1201 and 1202 respectively and who provide details about John prior to his accession(Medievalist, Riley, 1853, Stubbs, 1876); **Gervase of Canterbury** (died 1210) who

provides a limited account; **Gerald of Wales** (1146- c 1223) who left garnished but oft-quoted reports of John, in contrast to the measured tones of the unnamed **Barnwell Chronicler**. (Stubbs, 1880);(Brewer et al., 1861);(Stubbs, 1873)

Perhaps more pertinent to this study are the detailed accounts which are found in the writings of **Roger of Wendover**, Benedictine monk of St Albans Abbey and Prior of Belvoir Priory, Leicestershire until 1219 and **Ralph of Coggeshall**, Essex who was Abbot of its Cistercian Abbey and clearly drew on Cistercian eyewitness accounts. (see Appendix 8)(Giles, 1849, Stevenson, 1875) Their accounts however, are not without contention. David Corner suggests that Roger of Wendover began his account sometime between 1202 and 1231 and that he was still working on the text in 1234, and that the account of Ralph of Coggeshall, traditionally dated to 1207 -1218, was at least multi-scribed if not actually multi-authored, with the period 1206 -1212 being augmented retrospectively soon after 1212.(Corner, 2004)

Two additional and often quoted sources also merit mention. The first is **L'Histoire de Guillaume le Marechal**, paradoxically the earliest example of French vernacular literature yet written to eulogise an English knight, which holds accounts of events that have some hallmarks of eyewitness testimony, even if the details are somewhat scrambled by poetic licence. The second is the annotations made by **Matthew Paris** (born c. 1200) who only knew of King John as a child/teenager but who nevertheless "*improved on and added to the scandalous stories of Wendover* ", gifting to later historians such sensationalist headlines as: "*Foul as it is, hell itself is defiled by the fouler presence of John*" (Holt, 1963)p23; (Green, 1877)p200.

The term "contemporaneous" may therefore need to be viewed with caution, both with regard to accuracy and the influence of hindsight and is perhaps best summarised by JC Holt:

*Roger of Wendover was not writing about the end of John's reign until after 1225; Ralph of Coggeshall... probably did not begin his account of the period after 1207 until 1221 or thereabouts; the Barnwell chronicler most probably composed his work in the 1220's and was adding to it as late as 1232; the biography of William Marshal was begun after 1219 and completed in 1225-6; The Histoire des Duc de Normandie ends in 1220 and was probably composed after that date; the section in the annals of Waverley on the later years of John's reign was written after 1219, probably between 1221 and 1227; the Margam annals are probably even later; some annals, like those of Burton are only known to us in later thirteenth century versions.*

*... there can be no doubt that time told against John's reputation... Rigord's first version [1196]... is quite neutral ... up to 1206 preserves this atmosphere... At this point William the Breton took over and... between 1214 and 1227 ... the creditable story is suppressed and John is already presented as treacherous.*

(Holt, 1963)p22

## 2.5.2 Modern Evaluation

The background to the modern evaluation of King John can be dated to the start of the 18th century which saw an European wide demand for open government.(Hardy, 1869)pp i-viii. This led to historical documents of state being made available to the public, and in England to the publication of **Rymer's Foedera** (1704-1713) which contains 321 records relating to King John.(Hardy, 1869)pp11-22.

Inference of previous attitudes however, can be drawn from **Shakespeare's** eponymous play (circa 1594-96) where King Philip " *play[s] fast and loose with faith... of smiling peace to march a bloody host*"; King John appears tormented: " *within me is a hell ... the tackle of my heart is crack'd and burn'd ... this fever that hath troubled me so long lies heavy on me*", while the Bastard (of Richard) cries " *Mad World! Mad kings! Mad composition...*" (Shakespeare, 1594-96) This contrasts with David Hume (1711-1776) writing 150 years later in 1754, who said that of " *such general terror had this man [King John] impressed by his violent conduct*" and " *thought of nothing but how to make his own advantage of the public calamities. That traitor...*" He further reasoned that " *no one thought of defending a man who seemed to have deserted himself*".(Hume, 1754-62)loc 6713, 6812 & 7137. Yet **Hazlitt** (1778-1830), writing a further fifty years later in 1817, and commenting on the characters in Shakespeare's plays, recognised the personal tragedy and differentiated between the monarch and the man:

*The treachery of King John ... something whispers us [sic] that we have no right to make a mock of calamities like these, or to turn the truth of things into the puppet and plaything of our fancies. ... The crimes he is tempted to commit are such as are thrust upon him rather by circumstances and opportunity than of his own seeking; he is here represented as more cowardly than cruel, and as more contemptible than odious.*

(Hazlitt, 1817)loc 2752,2760.

Between Hume and Hazlitt, opinion had changed, not least by the financial reforms imposed by parliament on the accession of George III in 1760 and which became known as the Civil List.(TheCrownEstate) Having assumed responsibilities and liabilities for the Crown Estate, parliament eventually established six Record Commissions on Public Records which sat between 1800 and 1837.(NationalArchives) Their remit was not only to furnish the legal and documentary basis of the Crown Estate but, with the increasing recognition of their importance, to provide for better access and storage of the national archive. This resulted in the creation of the Public Records Office by Act of Parliament in 1838. The itinerary of King John, which is key to this investigation, was thus compiled and published by **TD Hardy**, lawyer

of the Inner Temple, under the auspices of the Record Commission 1831 and published in 1835.(Hardy,1835a)

The political world had also changed, forced by the popular revolutions in both America (1775-1783) and France (1789-1799) to explore the meaning of liberty. It would be an easy but erroneous fallacy to assume constant battle lines between the Whig proponents of parliamentary government and the Tory supporters of Crown and Church, or indeed that *Magna Carta* was a recognised and recurrent rallying cry.(Burrow, 1981)p2-4. The Whig historian **Macauley** (1800 -1859) reasoned that

*Had the Plantagenets ... succeeded in uniting all France...it is probable that England would never have had an independent existence. ...Had John inherited the great qualities of his father... even possessed the martial courage of Stephen or of Richard and had the King of France at the same time been as incapable as all the other successors of Hugh Capet had been, the House of Plantagenet must have risen to unrivalled ascendancy [sic] in Europe. .. "Of James the First, as of John, it may be said that ... we owe more to his weakness and meanness than to the wisdom and courage of much better sovereigns.*

(Macauley, 1890)pp 25, 72

Equally, **Hallam** (1777-1859), in his three volume *History of Europe during the Middle Ages* (previously published title: *Middle Ages*) makes little of the contentions of King John's reign, such as those surrounding his accession or those associated with the alleged murder of Arthur.(Hallam, 1900)p25.

Instead it appears to be **William Stubbs** (1825-1901), "*the doyen of English medieval historians*",((Warren, 1978) p16,n1) Tory historian, Regius Professor of History at Oxford (1866-1884) and subsequently Bishop of Oxford (1889-1901), who made the issues of John's reign both personal and familial:

*What marks out John personally from the long list of our sovereigns, good and bad, is this- that there is nothing in him which for a single moment calls out our better sentiments: in his prosperity there is nothing we can admire, and in his adversity nothing that we can pity. ... John has neither grace nor splendour, strength nor patriotism. His history stamps him as a worse man than many who have done much more harm...*

*John, then as far as I can read his character from his acts, was a mean reproduction of all the vices and of the few pettinesses of his family, of their intellectual as he was of their physical conformation. I say a mean reproduction, because although his crimes were really greater, they are on a smaller scale, from smaller motives, significant of that more unbridled vice that checks at no obstacle and yields to the least temptation. Like his father he is a profligate but his sins are complicated with outrage and ingratitude; like Richard he is an extortioner, but unlike him he is meanly mercenary, parsimonious, unsuccessful. Like Geoffrey he is*

*faithless, but unlike Geoffrey he is obstinate rather than impulsive. He never repents, even if it be only to sin again; he has no remorse, even for his failures. He contemns [sic] both the spirit and the form of law; of religion he has none, scarcely sense enough of it to make him found a monastery; he neither fears God nor cares for the souls of his people, but he is amenable to superstitions that his father would have spurned. He is passionate, like the rest of the Conqueror's descendants, but it is not the lion-like transport of Henry and Richard; he is savage, filthy, and blasphemous in his wrath; but he sulks where he dare not reply and takes his revenge on the innocent.*

(Stubbs, 1873)pp xi,xv

Stubbs' comments became the received wisdom and were echoed by his contemporary **JR Green** (1837-1883) in his *Short History of the English People* and by Green's editor and protégée, **Kate Norgate** (1853-1935) in her *John Lackland*, all drawing heavily on the opinions and accounts of the chroniclers and annals.(*Green, 1877, Norgate, 1902*)

In contrast, **FM Powicke** (1879-1963) favoured a forensic approach and more comprehensive review that lent additional weight to both continental sources and the documents of state, and is well illustrated in his book, *The Loss of Normandy 1189-1204*. (Powicke, 1913) His pupil and direct successor to his Regius Oxford chair, **VH Galbraith** (1889-1976) took this further and both promoted the overriding importance of the state documents in his "*An introduction to the use of the public records*", while warning against any reliance on the clerical chroniclers, some of whose accounts were "*highly improbable*" and "*only really [a] silly story*" (Wendover and Paris respectively).(Galbraith, 1934, Galbraith, 1982)pp18,37. Subsequent historians of the 20th century such as **Joliffe** (1891–1964), **Stenton** (1894–1971), **Painter** (1902–1960),**Duby** (1919–1996), **Holt** (1922–2014) and **Warren** (1929–1994) and current historians such as **Barratt, Bradbury, Church, Crouch, Turner** and **Vincent**, appear to have followed this advice in the main.

Alternative analytical approaches have recently gained recognition. **Bradbury** reviewed the personalities of King John and his protagonist, King Philip of France and considered King John's actions in differing public roles such as commander, soldier, lord and Christian ruler or in his interpersonal interactions as husband and family member: "*an arbitrary choice except that, being areas in which each king has been criticised, they allow some comparison.*"(Bradbury, 1999) This clearly differs from a psychological assessment of personality which typically considers the interaction of personality traits.(Clark, 2007, Bagby and Ryder, 2000) Translational terminology has also been used: **Crouch**, when considering the circumstances surrounding Magna Carta, attributes "*unreasoning fear and persecution [sic] mania – paranoia*" as "*a powerful part in the preliminaries to the conflict, as in several other*

*outbreaks of civil war*" before suggesting that *"it was unresolved and unchecked suspicion on both sides that led to the paranoia..."* (Crouch, 2010) p45 These may represent the start of a new historical approach into the inconsistencies of King John's reign and if so, then this investigation fits readily into that development.

## **Chapter 3: From Itinerary to Time series**

This chapter describes how the information in TD Hardy's itinerary was prepared for time series analysis using Change Point Analysis. This is equivalent to providing a translation of an ancient document with textual notes, in order to ensure that the process is transparent and robust. The methods and results of each stage are presented below in Sections 3.1 and 3.2 and supported by additional material in Appendices 1– 4.

The core aim of this submission is identify possible changes in King John's itinerary that might be attributed to bipolar disorder. Before this can be done however, the study must identify any intrinsic patterns of change within the data. Section 3.3 therefore presents a descriptive analysis of parameters relevant to the study, in order to explore this possibility and define their influence.

### **3.1 Data Generation**

#### **3.1.1 Location identification**

#### **3.1.2 Travel time Moderation**

### **3.2 Data Preparation**

#### **3.2.1 Statistics and distributions**

#### **3.2.2 Imputation modelling**

#### **3.2.3 Clinical criteria**

#### **3.2.4 Uncertainty**

### **3.3 Descriptive Analysis**

#### **3.3.1 Activity**

#### **3.3.2 Time**

#### **3.3.3 Variables relating to choice**

## **3.1 Data Generation**

### **3.1.1. Location Identification**

The importance to history of accurately identifying dates has long been recognised, with Hardy quoting Sir Harris Nicolas (1799-1848): "*that dates are to history what the latitude and longitude are to navigation, fixing the exact position of, and serving as unerring guides to, the object to which they are applied.*" (Hardy,1835a)p105. The same could be said for the significance of location and its precise co-ordinates, not only an essential guide to travelling, but something which grounds history in the physical world. In addition, the study sought to ensure the accuracy and validity of each

location because this was the foundation of its mathematical assessment. To that end, extensive research was carried out to identify and validate each location using historical and geographical authorities, with much of this work being done as a feasibility exercise, prior to my enrollment.

For each of the 655 locations from King John's itinerary as published by TD Hardy, a gazetteer entry was made and listed under geographical areas e.g. England and Wales (444 locations); France (186 locations) and Ireland (25 locations). For each location, the modern county or department was identified along with its geographical coordinates, which were subsequently used to calculate travel distances. Multiple historical and geographical references were obtained for each location to ensure the validity of its choice. For many locations, whose name and fame had not changed, this was a straightforward task. However, one location defied identification – *BOIS near Bordeaux* (16-18 July 1200) – as this name could refer to a temporary hunting camp within the forest (*Fr. bois*), or one of the many locations with this suffix in the surrounding area.

In addition to Bois, the identification of a small minority of locations was problematic. Some place names had changed e.g. there was only one *Charterhouse* foundation in England during King John's reign and that location is now called Witham Priory. The study also identified 18 location name duplication (1 France; 17 England). e.g. there are 3 locations called *Ashley, Hampshire* and, by conserving distance, King John was likely to have visited all three. Further details of these changes and duplications, and how their identification was resolved are presented in Appendix 1.

Some locations appeared to create journeys that were either illogical, unfeasible or both, when viewed on a map and as a sequence. For example, illogical journeys appeared to arise from original clerical error on 9 occasions - when perhaps the Roman numerals V and X had been poorly written and so misinterpreted, or when accidental marks on the vellum might have been interpreted as additional ink strokes. All nine were part of multiple entries (more than one location/date) and so their exclusion from the study calculations did not materially affect the distance travelled. Equally, the study found 9 unfeasible journeys where Hardy's attribution was unlikely given King John's general direction of travel e.g. *Bernewell* is unlikely to be Barnwell but rather Burwell Castle enroute from Kimbolton to Bury St Edmunds (17 Mar 1201), and for similar reasons, *Yarrow* is unlikely to be Jarrow but rather Yarm (31 Jan 1216). This does not include the glorious typographical error in Hardy's *Index to the Itinerary* which puts King John at DoNcaster (18, 19 Apr 1201) instead of DoRchester, enroute from Cranborne to Bridport and Exeter, although in Hardy's defense, the actual itinerary states Dorchester. Likewise, errors of sequence (as presented by Hardy) were identified in 92 days when King John issued documents at three or more locations and 846 days in two locations. Of the 92 days, the order of locations given by TDH was amended for 25 days (27%) to better

conserve travel distance. Further examples of re-orderings and reallocations, and their justification, are presented in Appendix 1.

From this work, the study itinerary was updated in Excel to show the latitude and longitude coordinates for all but one location (n = 654) and these coordinates used to generate the Euclidean distance that represented King John's journeys. (see Appendix 2) The Euclidean distance (as the crow flies) was chosen to overcome the uncertainty over King John's precise route and because it is a recognised methodology in a rural environment. (see Section 2.4.1) All measurements introduce errors but the Euclidean distance created a standard error for each journey. This not only ensured a replicable database but avoided debate over changes in land routes and in coastal regions, and variations in river courses and waterways, that are inevitable with the passage of eight centuries.

### ***Magna Carta Project Comparison***

The accuracy of the study location allocation was also compared to the Magna Carta Project (MCP), *"a landmark investigation of Magna Carta 1215... providing resources for ... scholars, schools and the general public."* and where *"the itinerary [here] has been remade from scratch."* (Vincent, 2015) It found that of the 133 places identified by the study from TD Hardy for this period, 14 (10%) were changed by MCP of which 5 (3.7%) were English and 9 (6.7%) French. Of these 14 locations, the study contested 8 and accepted 6 (4.5%). Comparative testing of study itinerary vs. MCP, using the study methodology of Change Point Analysis (CPA), showed comparable changes. Together, these findings gave a measure of reassurance regarding the identification of locations by the study. Further details are found in Appendix 3.

### ***3.1.2 Travel Time Moderation***

To ensure consistency, the study allocated journeys to the first date when King John was found to be at a different location. However, the study identified 49 (2%) journeys where the travel time or daily activity score was greater than 50 (= miles /difference in calendar dates). The study therefore imposed a global adjustment to the estimate of the time available for each journey to moderate this unrealistic figure and which has already been mentioned regarding Richard's travelling (Landon, 1935) pp ix,x. This is illustrated and named after King John's journey to Rothbury.

On 15 February 1201 King John issued documents at Bamburgh; the following day he issued documents both at Rothbury and Hexham. The journeys have high certainty: King John's location is known for each of the 12 days before his departure from Bamburgh and each of the 6 days after arrival in Hexham. The total distance between Bamburgh and Hexham via Rothbury is 46.6 miles (Euclidean) which equates to an actual figure somewhere between 55.9 and 74.5 miles. The day length in February at this latitude is 9h 37mins (16 Feb), although adverse weather may not have

allowed full use of this time.(Lam) In addition, having investigated the terrain both personally and from Ordinance Survey maps, it is unlikely that King John undertook this journey within one calendar day.

The study therefore proposed an alternative scenario, suggesting that King John issued documents in Bamburgh on the morning of 15 Feb before travelling on that day to Rothbury where he stayed overnight (22.0 Euclidean miles). The following morning, he issued documents from Rothbury before leaving for Hexham where he arrived by evening and where the documents from Hexham were then issued. (24.6 Euclidean miles) It also suggests that Rothbury was a chosen destination, being at the effective midpoint of the journey between Bamburgh and Hexham. More importantly, it also meant that King John had a maximum of x2 days travel time (19h) despite the dates being consecutive. The Rothbury adjustment therefore moderates the journey time by adding one day to the difference in calendar dates to create the moderated activity score (MAS) i.e. distance (miles)/ time+1(days).

This adjustment particularly moderates journeys with high mileage as demonstrated in the table below. However the moderation over-corrects when there is a sequence of daily journeys.

**Table 6: Moderation of journeys to reflect potential travel time**

<b>Journey distance (miles) D</b>	<b>Calendar difference (days) T</b>	<b>Activity score D/T</b>	<b>Moderated Activity score D/(T+1)</b>
6	3	2	1.5
24	3	8	6
42	3	14	10.5

### **3.2 Data Preparation**

#### **3.2.1 Statistics and distributions**

The distributions of the data were explored so that the appropriate statistical tests could be applied subsequently and thus allow the study to draw valid statistical conclusions. This is equivalent to identifying the language of an ancient text in order to use the appropriate grammar and word-list to construct an accurate translation. However, unlike language families, the statistical choice is binary, being either a parametric (normal) or non-parametric distribution, even if like individual languages, there are many named statistical distributions.

The results showed that the data for journey distance (D), activity score (AS) and moderated activity score (MAS) was non parametric but did not exactly match 61 named non-parametric distributions nor was a Poisson distribution. However it did compare very favourably with the

appearance of modern travel time examples. (Taylor, 2012) Further details and graphs are presented in Appendix 4.

### **3.2.2 Imputation modelling**

Before the Change Point Analyzer™ could be used to analyze the study data, the issue of imputation needed to be addressed as time series analysis requires a data entry for every time point. King John's itinerary contains 1,885 "no record" days (excluding inferred sea travel, n=80days) for which there is no documentary evidence of his location. Imputation modelling compares different imputation values to find the best representation of King John's journeying and therefore the most reliable database from which to detect possible changes in activity.

The study tested three imputation values - zero, median and retro-imputation - where retro-imputation took the value of the journey and ascribed it retrospectively to the actual timeframe of the journey. Details of this methodology are shown in Appendix 4. Each imputation model was tested by CPA and each showed a number of changes. These changes were matched against 15 known events in King John's travelling which the study termed " historical bench markers" e.g. sea crossing or when documents were known to be missing e.g. regnal year 13. The retro-imputation model scored highest in this contest and was therefore used by the study for its main analysis. Further details are provided in Appendix 4.

### **3.2.3 Clinical definitions and criteria**

As a medical investigation, the study used ICD-10 diagnostic criteria to create clinical definitions and inclusion/exclusion criteria that were appropriate for the study. This is standard practice in clinical trials and required in advance of a study start to promote academic rigor and prevent retrospective re-evaluation. It is thus presented here as part of the preparation process in advance of the study analysis.

A medical diagnosis is a cumulative, descriptive process: looking for the pattern of symptoms typical of a disorder, which is called a syndrome if the causation is unknown. When one diagnostic criterion is regarded as a key observation then it takes precedence over others but this is unusual and symptoms are more often collated in a diagnostic hierarchy, as previously presented for bipolar disorder in Chapter 2.

So, for example, in seeking a diagnosis, the study must first exclude periods that do not comply with the ICD-10 criteria of mania lasting more than 4days and depression lasting more than 14days. Applying this in current practice, it immediately excludes transient changes in mood or activity that arise for other reasons such self limiting infections. Equally, by insisting on a number of different criteria, it excludes those who indulge in more than 4 days of frantic Christmas shopping from being

diagnosed with mania on this sole basis. Further, it cannot be argued that, by screening for compliant periods, the other diagnostic symptoms are more likely to be found in those periods, unless of course, it is as evidence of bipolar disorder. The probability of whether symptoms occur within or outwith a timeframe does not concern the diagnostic process, which only seeks to identify and collate them before applying the appropriate hierarchy of criteria. Thus, in addition to the ICD-10 guidelines, the following definitions and criteria were used to strengthen investigational robustness and ensure replicability:

### ***Clinical Definitions***

1. Swing periods occurred when changes in activity passed through the median band 8.00 – 8.99 (median = 8.45), whereas unipolar periods started or ended within the band. A median band, rather than median point, was used to exclude minor deviations from the median.
2. Sequential periods of similar polarity were considered to be one clinical period for the purpose of calculating the clinical period duration

### ***Clinical Criteria***

#### **Inclusion Criteria**

1. Include any period that met the diagnostic criteria for the minimum periods of changes in activity:  $\geq 4$  days of high activity;  $\geq 14$  days of low activity. (ICD-10)

#### **Exclusion Criteria**

1. Exclude any period that required statistical smoothing order  $\geq 8$  in the Change Point Analyzer™ to obtain program compliance i.e. where smoothing was greater than 1 week. This was chosen both to reflect the scale of clinical periods (4 and 14 days) and to limit statistical smoothing to a maximum of one week.
2. Exclude any period that contained an internal uncertainty of greater than 34.5%. This was done so that the most rigorous data was used to identify periods of altered activity in the primary analysis, although not precluding their inclusion in other analyses. The number was derived from the average uncertainty of the reign of 29.5% (1,885 no record days of 6356 reign) with a 5% band to accommodate the greater uncertainty at start of reign when compared to the end.

### **3.2.4 Uncertainty**

Uncertainty is the term used by the investigation to reflect the potential influence of the no-record days in King John's itinerary. A full account of this is provided in Section 4.3.1: Testing the Methodology: *Are the changes just a reflection of the sources or the missing data?*

Despite the reassurances found there, the study chose to exclude those periods that had high internal uncertainty from the clinical analysis i.e. those periods with a substantial number of no record days. The bar was set at the mean value for the study, plus 5% trim to accommodate the greater uncertainty at the start of the reign compared to the last years ( 29.5% +5% = 34.5% cut-off). This follows common clinical practice to ensure that any medical conclusions are derived from the most robust data.(Chapter 5) However, all periods were included in the analysis of circumstantial evidence (Chapter 6) irrespective of uncertainty, so that all identified changes were tested against the historical record.

### **3.3 Descriptive Analysis**

The core aim of this submission is identify possible changes in King John's itinerary that might be attributed to bipolar disorder. Before this can be done however, the study must identify any intrinsic patterns of change within the data as these might skew the results of the bipolar analysis by either obscuring them and leading to false negative results, or by compounding them and creating false positive results. A number of parameters were therefore explored for potential patterns within the data: the primary parameters relate directly to King John's travelling activity i.e. sources, distance and no record days, while the secondary parameters investigate the influence of external variables i.e. time and choice.

#### **Primary parameters**

##### **3.3.1 Activity**

1. *documentary days*
2. *travel & distance*
3. *no record*

#### **Secondary parameters**

##### **3.3.2 Time**

4. *weekdays*
5. *season*
6. *aging*

##### **3.3.3 Variables relating to choice**

7. *accommodation*
8. *activity during religious festivals*

#### **3.3.1 . Analyses of variables relating to activity**

Documents recording the date and location of King John encompass 4,390 days of his reign (69% of 6,356 days) and these were termed, documentary days. Assuming that a change in location inferred a journey, King John's reign could also be further subdivided into

- 2,367 (37%) journey days (when there was a change in location);
- 2,024 (32%) administration days ( when there was no change in location);
- 1,965 (31%) no-record days ( when there was no documentary support)

The documentary days (69%) were therefore the sum of the journey days (37%) and the administration days (32%).

## ***1. Analysis of Documentary days***

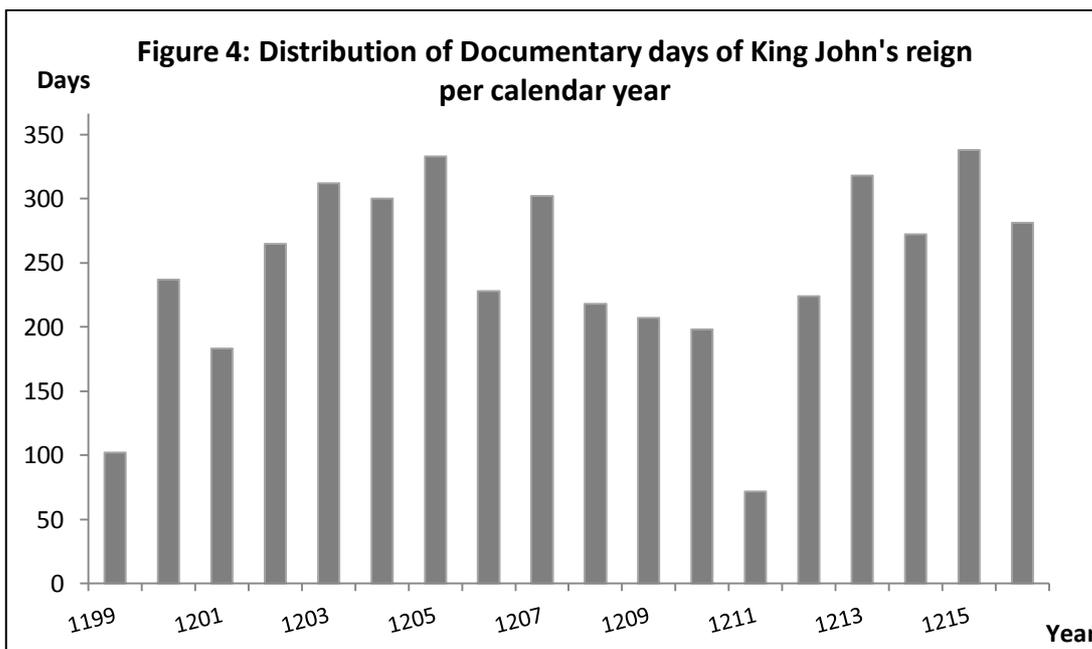
TD Hardy constructed King John's itinerary from documentary sources. However those sources have a variable pattern of survival over the course of the reign and what is available today may differ from that sources available to TD Hardy. Common sense might infer that there will be a correlation between the documentary days and the pattern of sources but it was important for the study to both describe this graphically and then test whether there was a statistical correlation so that this result could be compared objectively to other analyses.

For example , the study also noted that the sources were compiled in regnal years rather than calendar years. King John's regnal years vary because the start on Ascension Day which is a moveable feast. As this too could create a pattern within the data the study also tested whether there was a statistical association between the regnal year length and the documentary days.

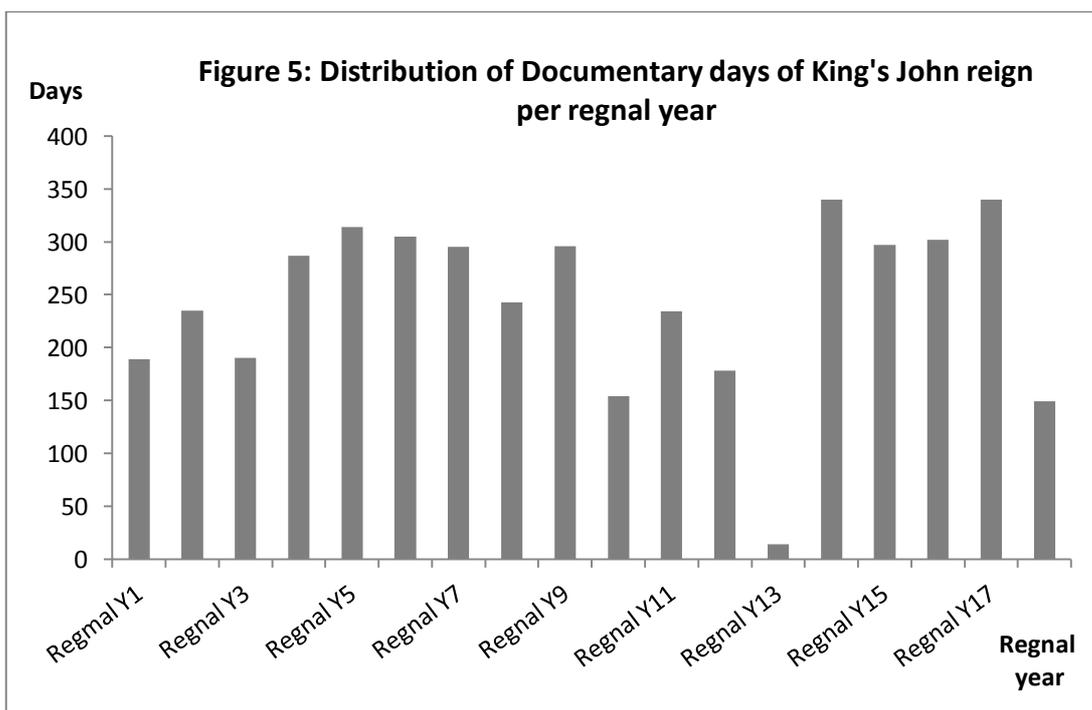
Figure 4 shows the graphical description of the documentary days per calendar year which is the baseline for this investigation. The figure appears to describe a bimodal trend maximal at 1205 and 1215 and minimal at around 1201 and 1210. Figure 5 shows a similar graph depicting the same information per regnal year but presenting a less obvious pattern. An estimate of the actual sources available to TD Hardy, and those available nowadays, are shown diagrammatically in Figures 6 and 7 respectively and also confirm the pattern.

The Spearman's Rank two tailed statistical test confirmed these observations. It showed a strong correlation between estimated the sources and the documentary days, whether those estimated to be available to TD Hardy ( $R = 0.74 @p=0.0004$ ) or nowadays ( $R = 0.54 @p=0.02$ ). (The stronger the correlation the nearer the R value is to one, and least when close to zero. The minus or positive attribute of the R value indicates the direction of the relationship.) This confirms that, despite the crudeness of both estimates, the bimodal distribution pattern of the documentary days reflects the availability of the sources that underpin the itinerary.

In contrast, the regnal year length and the number of documentary days, does not show a strong correlation. ( $R=0.25@p= 0.32$ ) This suggests that the changes in the regnal year length do not have a significant influence on the distribution pattern of the documentary days seen in Figure 5.

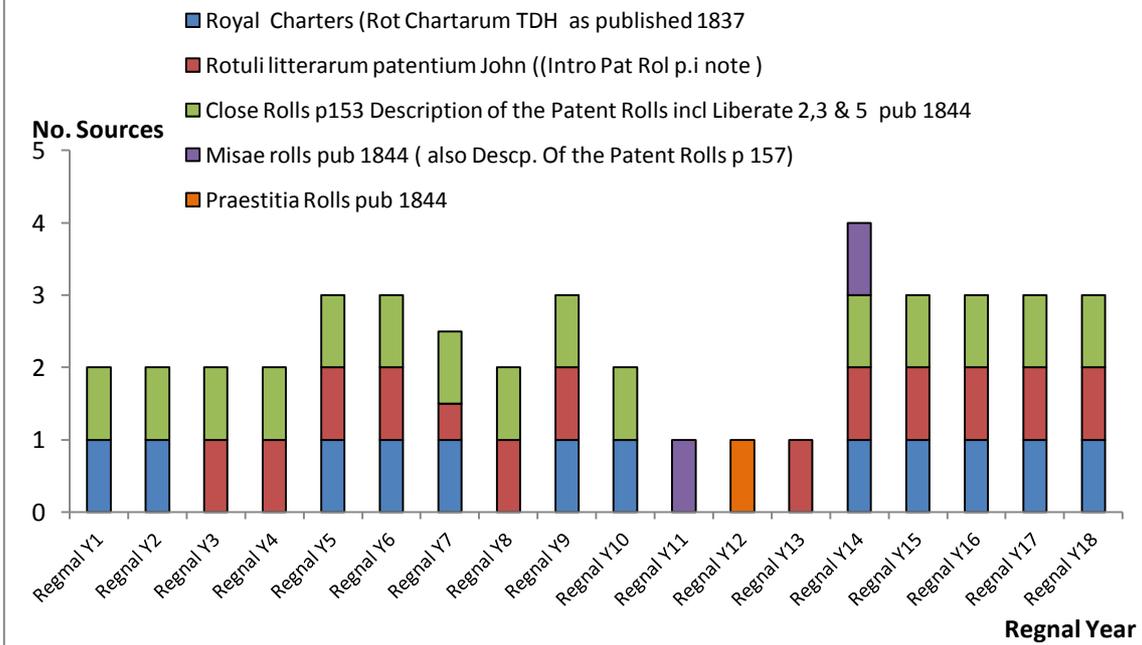


*Histogram of number of days (y-axis) plotted against calendar year (x-axis) showing the number of days during each calendar year when King John issued documents. Each document recorded the date and location of issue: this data underpins the itinerary*

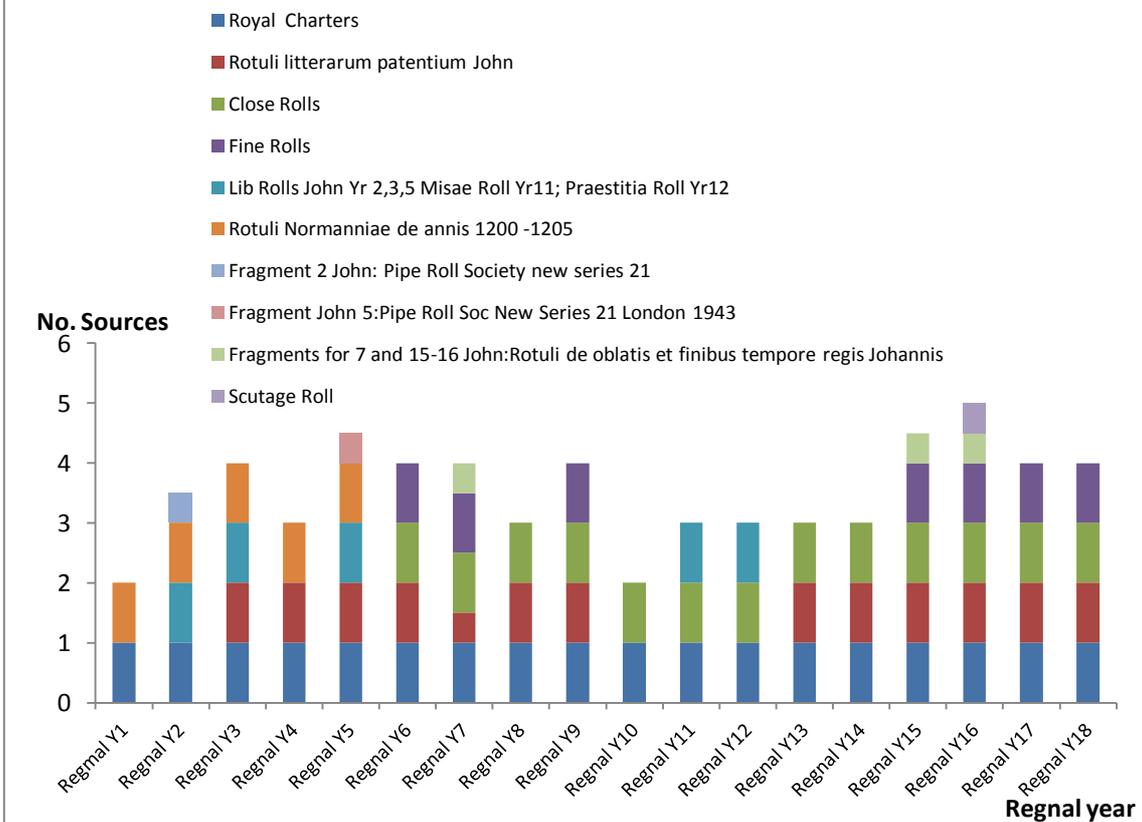


*Histogram of number of days (y-axis) plotted against regnal year (x-axis) showing the number of days during each calendar year when King John issued documents. Each document recorded the date and location of issue: this data underpins the itinerary*

**Figure 6: Graphical Representation of the Availability of Major Sources to TD Hardy ( n=5 est.)**



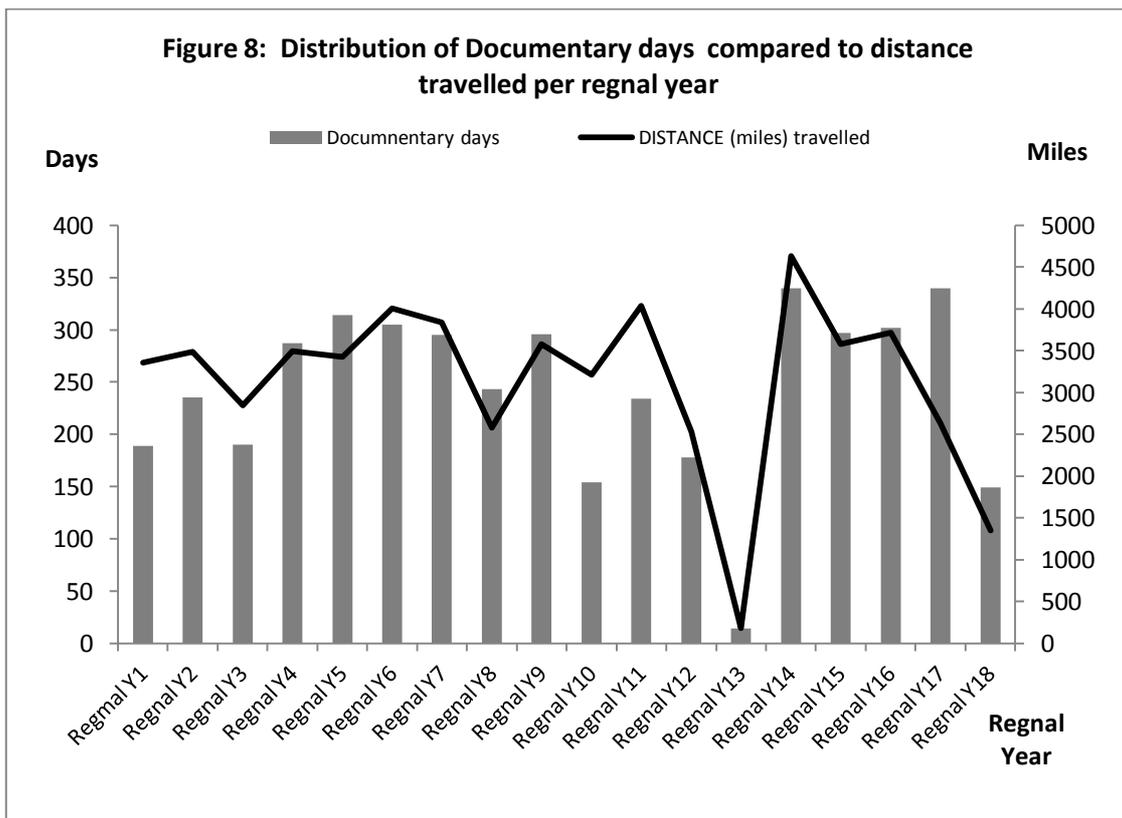
**Figure 7 Graphical Representation of Published Sources today ( n=10, est.)**



## 2 Analysis of travel & distance

King John travelled an estimated 56,478 miles (Euclidean) over the 17 years of his reign. This yields an average annual mileage of 3,138 miles; an average daily distance of 8.8 miles; an average journey of 24 miles, and an average change of location every 2.7 days (despite the statistical reservations of using the average function when dealing with non-parametric data). Using the conversion constant published by Cole and King (x1.2–1.6), this equates to between 67,774 and 90,365 actual miles travelled.(Cole and King, 1968)

It was important to compare the annual distance and the annual documentary days to establish if the pattern of documentary days was reflected in the annual distance King John travelled or whether it was independent. Using the regnal year data and the Spearman's Rank two tailed statistical test a strong positive correlation was found. This confirms the common sense view that the presence of more documents identified more journeys, and therefore greater distance and vice versa.. (R= 0.61@p= 0.01). This is illustrated in Figure 8.

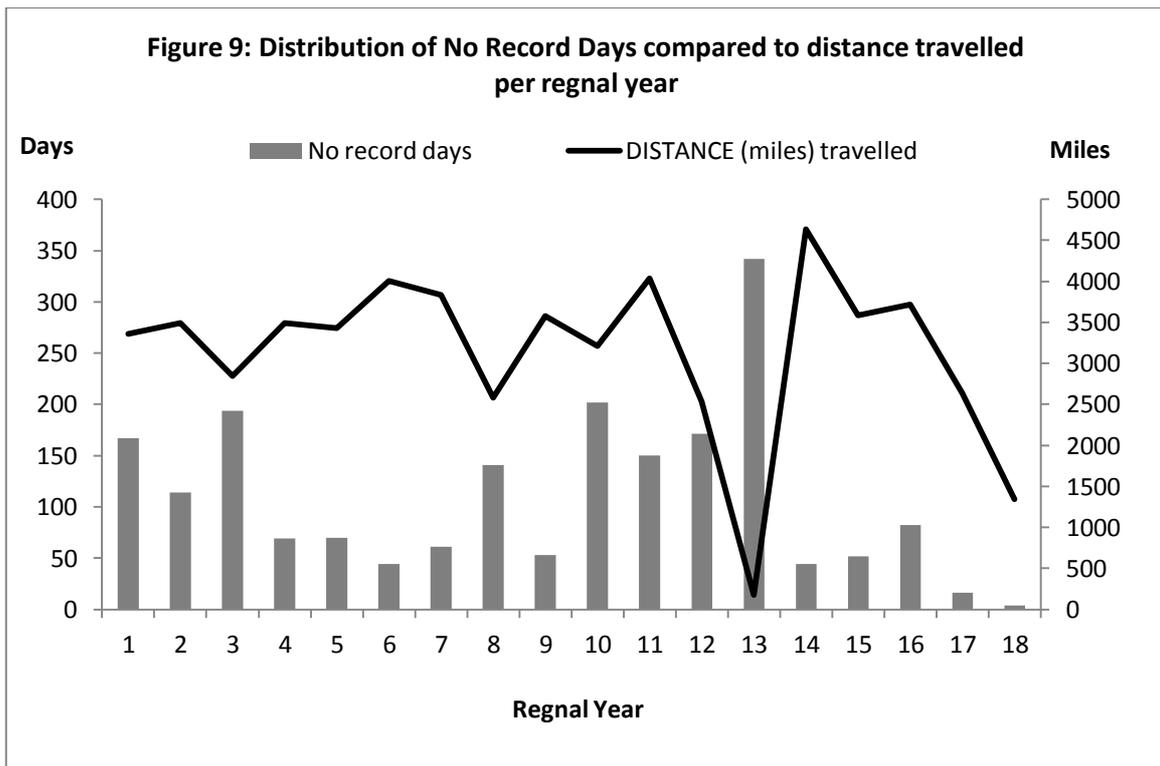


*Histogram of number of days(y-axis) and distance ( miles) (y-axis) plotted against regnal year (x-axis) showing the number of days during each year when King John issued documents (documentary days) compared to the distance he travelled during the same time period. This shows a good match that is confirmed statistically.*

### 3 Analysis of no record days

The analysis of the no record days is not just the analysis of a remainder.- what is left after the documentary days have been excluded from the reign. It also represents potential leisure time, or illness in the king, or quiet times in the business of medieval kingship. It is also an indication of uncertainty in the data, an aspect that is important to the study and investigated in detail later in Chapter 4.

A total of 1,965 no record days were identified, excluding the 80 days that involve sea crossings, when King John had little personal control over his destination or rate of progress. Using the regnal year data and the Spearman's Rank two tailed statistical test, a weak correlation was demonstrated between the no record days and the distance travelled each regnal year ( $R=-0.35@p=0.14$ ). It might have been argued that a greater annual distance might have required more recovery time and that this might be reflected by a greater number of no-record days. However this analysis has dispelled that argument. (see Figure 9)



*Histogram of number of days (y-axis) and distance (y-axis) plotted against regnal year (x-axis) showing the number of no records in King John's itinerary compared to the distance he travelled during the same time period. This shows a poor match that is confirmed statistically.*

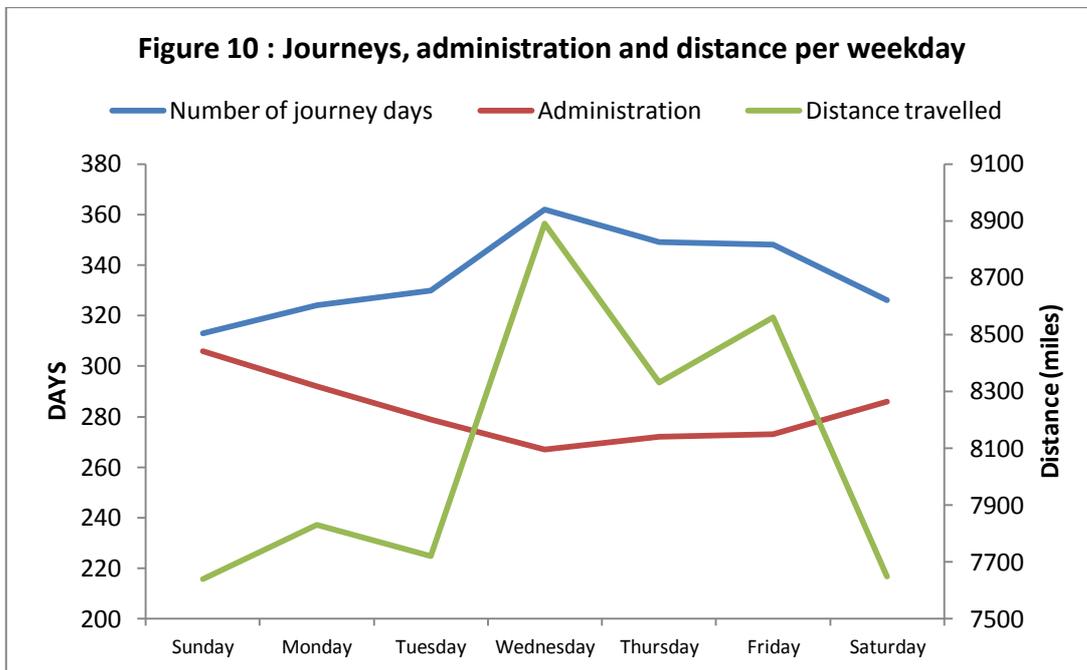
### 3.3.2 Analyses of variables relating to time

#### 4 Weekday preferences

The study investigated both weekly and weekend travel because weekly variations are common e.g. Friday was a weekly fast day followed by a feast day on Sunday. King John's itinerary might therefore show weekly patterns of change basis that could influence the study analysis.

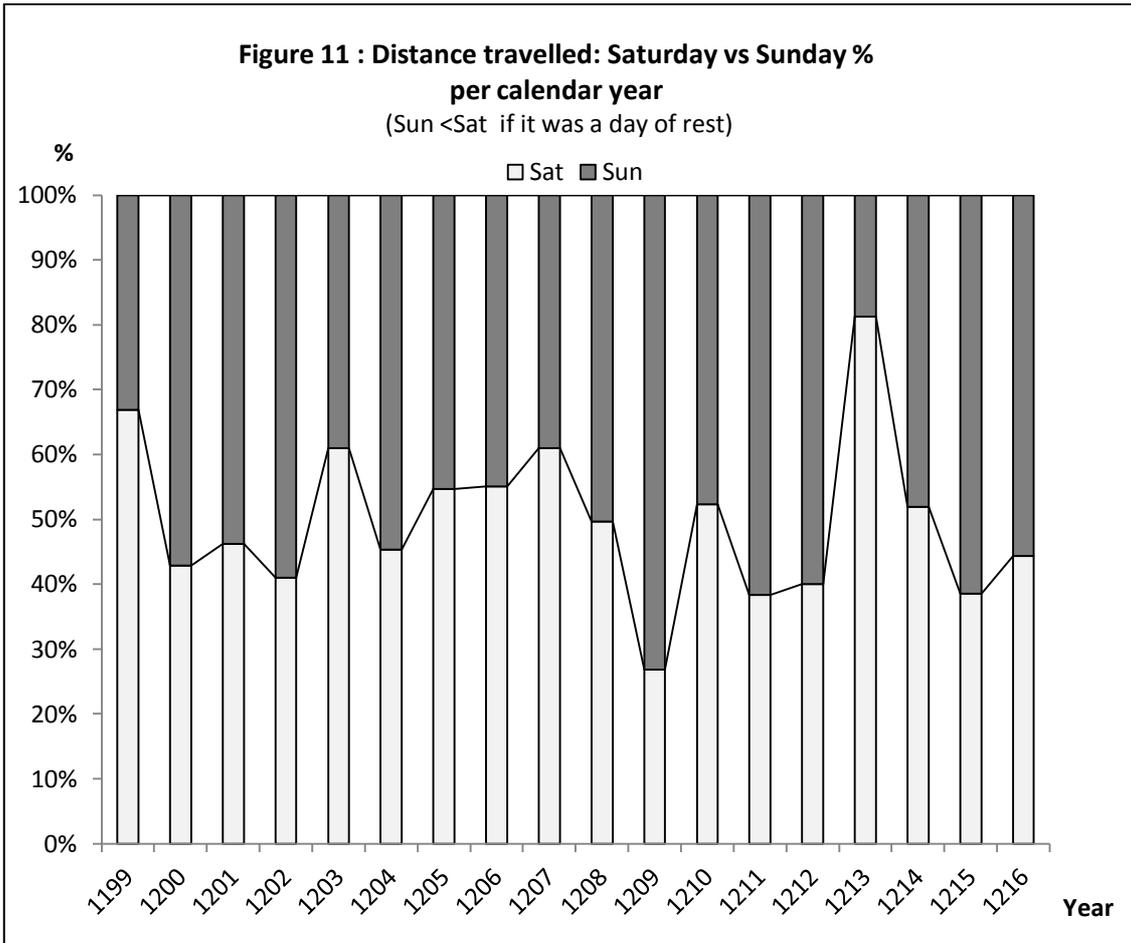
The data from the itinerary demonstrated that King John exhibited a clear preference for starting journeys in the latter half of the week i.e. Wednesday to Friday. These journeys were also of greater distance than ones started on other days.

Figure 10 shows a collation of journey numbers, administration and distance according to their weekday start. Changes in journey number and administration clearly mirror each other; distance shows the preference for long journeys starting on Wed- Friday and mirror the increase in journey numbers. Further details about monthly patterns are presented in Appendix 5.



Graph of number of journeys (y axis left), distance (y-axis right) and weekday (x-axis) showing a mirror image between journey number and administration, and a matching pattern between distance and journey number. This means that journeys starting Wed-Fri were more common and longer.

An analysis of weekend travelling, by comparing distances travelled on journeys that started on Saturday and Sunday, showed fewer Sunday starts in 1199, 1203, 1205-07 and 1213 which would be expected if Sunday was being treated as a rest day or one of religious observance. (see Figure 11; further details demonstrating their comparability are presented in Appendix 5) The pattern is significantly reversed in 1209 when over two thirds of his weekend journey starts were on Sunday.



*Histogram of relative percentage of journeys starting on Saturday compared to those starting on Sunday (y-axis) plotted against year (x-axis). During 1199, 1203, 1205-1207 and 1213 King John travelled much less distance from a Sunday start day, when compared to a Saturday start day.*

## 5 Seasonal differences

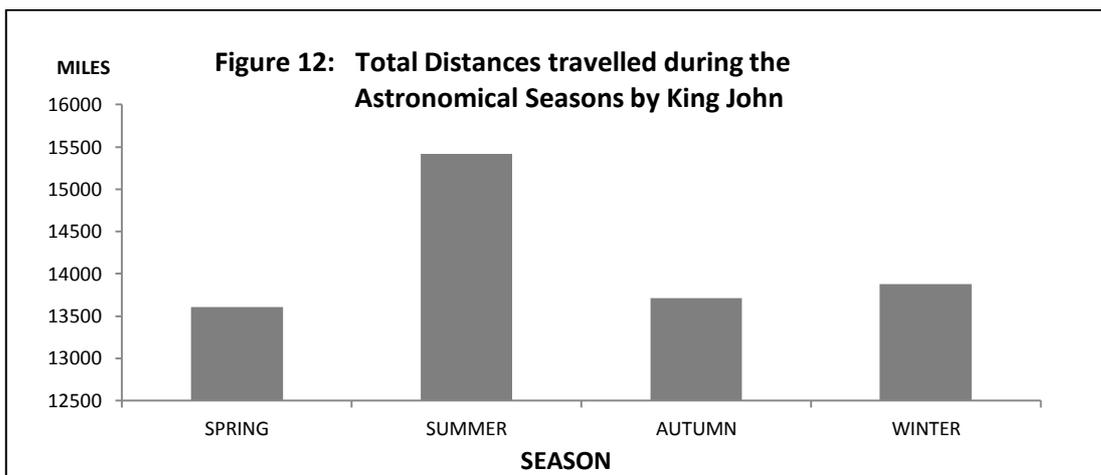
Seasonality in bipolar disorder is associated with the changing light intensity of the solar year. (Cassidy and Carroll, 2002) Equally, it is generally accepted that people tend to travel more in warm dry weather with longer day length. Seasonal differences in travelling were therefore recalculated using the astronomical calendar (Vernal Equinox, 21st Mar; Summer Solstice, 21st Jun; Autumnal Equinox, 21 Sept; Winter Solstice, 21 Dec.).

Figure 12 shows that King John not only travelled most in summer (June-Sept: 15,417 miles/625 journeys) but also that he travelled a substantial distance in winter (Dec -Mar: 13,880 miles/577 journeys), with his lowest distance in Spring (Mar- Jun: 13,605 miles/606 journeys). This compares to autumn (Sept-Dec: 13,715 miles/548 journeys).

There are also notable seasons when he travelled in excess of 1,000 miles per season (Table 2) Their annual distribution is reminiscent of the bimodal pattern seen in Figure 4 and which is linked to the availability of the sources. However the seasonal mileage offers an insight into the patterns within the data for each year.

**Table 2: High Seasonal Mileage ( $\geq 1,000$  miles/season)**

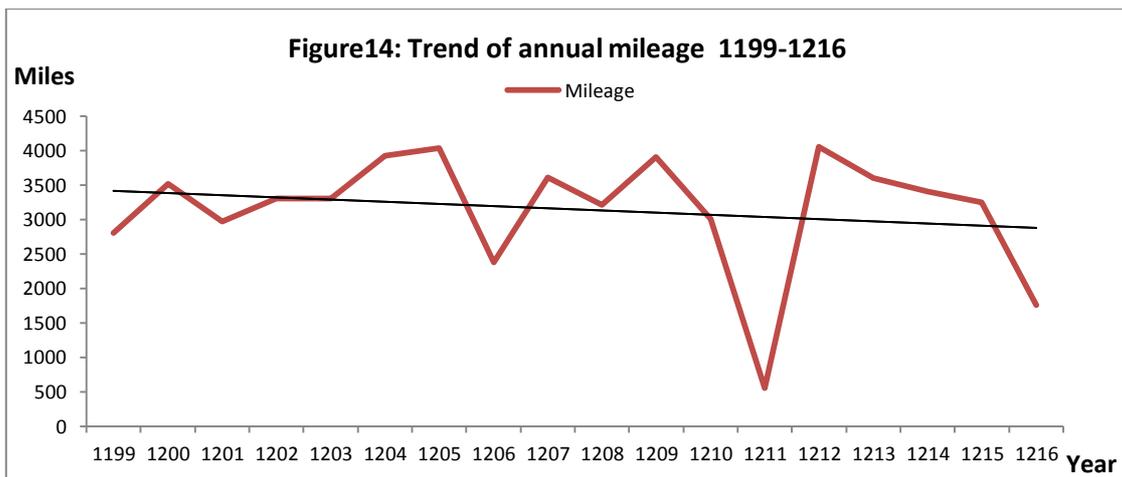
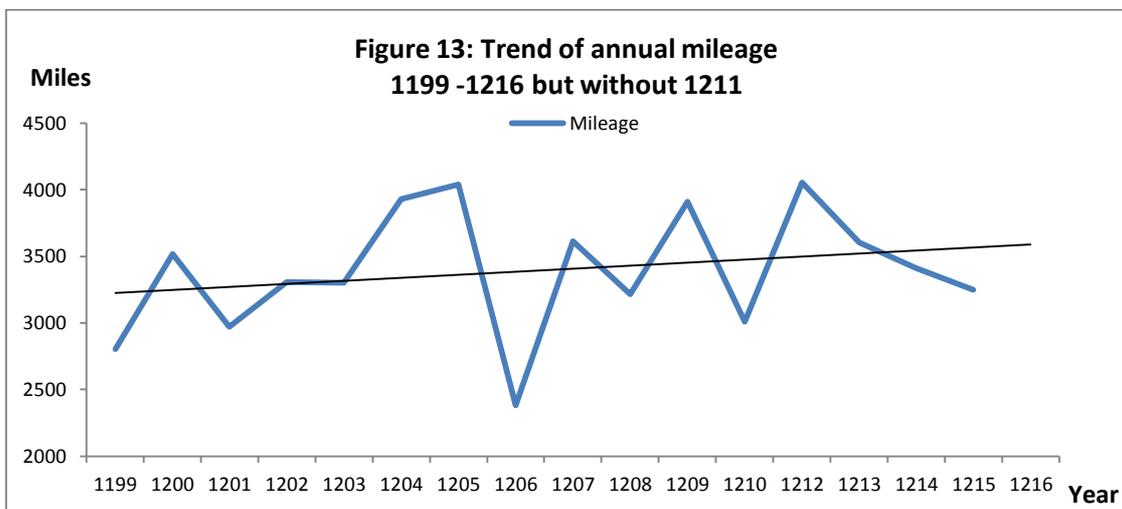
Year	Seasonal mileage in excess of 1,000 miles			
	Spring	Summer	Autumn	Winter
1199			✓	
1200				
1201			✓	
1202		✓		
1203			✓	
1204		✓	✓	
1205	✓		✓	
1206				
1207				
1208				
1209	✓	✓		
1210				
1211				
1212		✓	✓	✓
1213		✓		
1214				
1215	✓			
1216				



*Histogram of distance (miles, y axis) plotted against season (x-axis) showing not only the predominance of travel by King John during summer but also that during winter.*

## 6 Aging

In any clinical study over a 17 year period, the effects of subject aging would be expected. The annual mileage or distance was analysed as a more realistic physical measurement than number of journeys alone. A trendline has been included although, as it is based on the R-squared statistic, this requires careful interpretation given the non-parametric distribution of the data. Figure 14 shows a falling trend line with advancing years although this may be influenced by the missing data of 1211/12. Remodelling the results without 1211 shows a rising trend line.(see Figure 13 and note the change in scale of y-axis) Taken together, this suggests that aging was not a significant factor in King John's travelling activity.



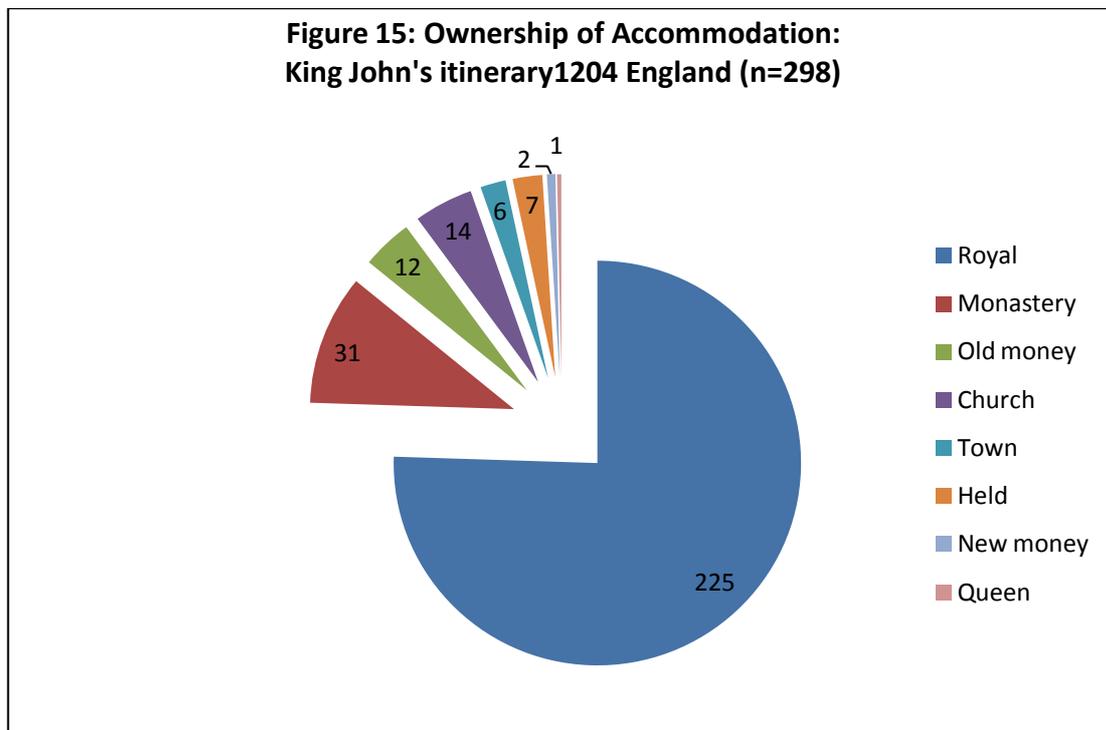
Both graphs show King John's annual mileage (y-axis) plotted against the calendar year. Figure 16 (all years of reign) shows a falling trend whilst Figure 15 (without the missing data from 1211) shows a rising trend. Taken together, this suggests that, aging is not a significant factor.

### 3.3.3 Analysis of Variables relating to Choice

#### 7 Overnight Accommodation

It is presumed that King John exercised some personal choice in the selection of the locations listed in his itinerary. In addition, changes in his travelling distance might be seen if he deviated to reach specific type of accommodation, even if he has the ultimate option of camping *en route*. The identification of the precise ownership of each location at the time of King John's visit is only possible in England because of the wealth of historical information still available and in the public domain. The analysis of 1204 was therefore chosen as it is the first full year when King John was solely resident in England.

The pie chart results demonstrate the predominance of both the "crown estate" (76%) and the land held by the church and religious orders (45%).(Figure 15) "Old money" and "New money" distinguishes between established noble families and those whom King John " [*r*]aised from the dust." and who became a focus of discontent in the latter years of his reign. (Turner, 1988) "Held" accommodation was legally held by the king but not owned by him e.g. during the minority of the rightful heir or as *Terra Normannorum* - the land settlement after 1204.



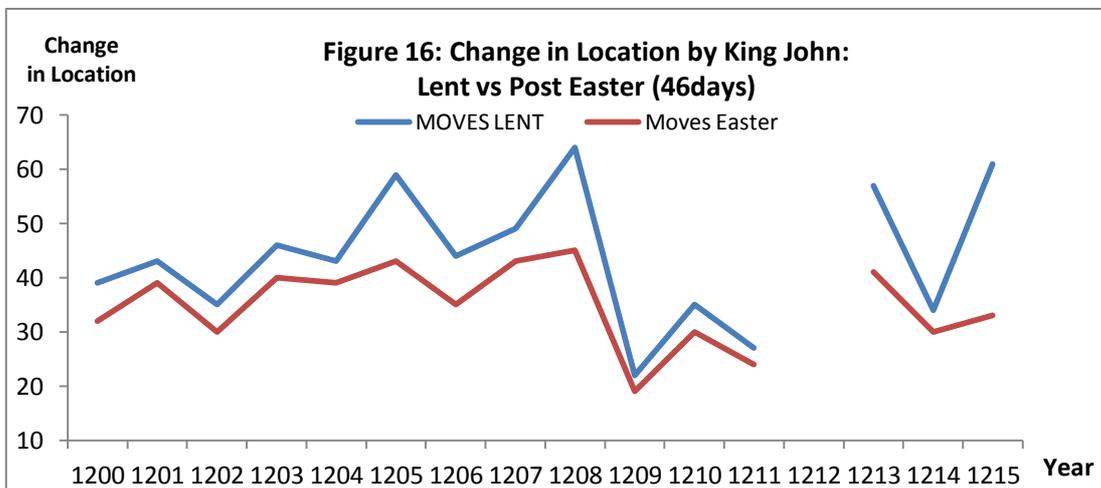
Pie chart presenting the frequency of different accommodation types based on ownership and visited by King John during 1204. It shows the predominance of crown holdings and the hospitality of the monasteries. King John legally "held" but did not own some locations e.g. during the minority of heirs or before transferring *Terra Normannorum*.

## 8 Religious Festivals

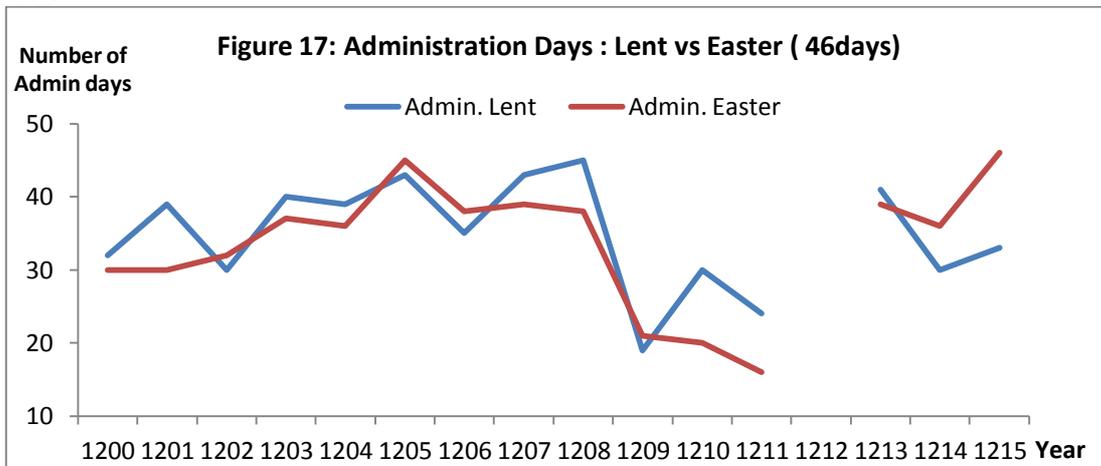
The requirements of celebrating either Christmas or Easter may have influenced King John's itinerary, enforcing a time of less travelling, perhaps at a prearranged venue. The observance of Lent and the celebration of Easter each last approximately six weeks (46 days). Comparable to Lent, Advent is also a period of fasting that starts 4 weeks before Christmas. However as the Christmas festival lasts only 12 days, this timeframe was used for comparison.

- **Easter**

Figures 16 and 17 demonstrate that the number of journeys started during Lent ( changes in location) was always greater than that during Easter (46days) throughout King John's reign. This suggests that, although the celebration of Easter curtailed King John's travelling, he often continued with his administration.



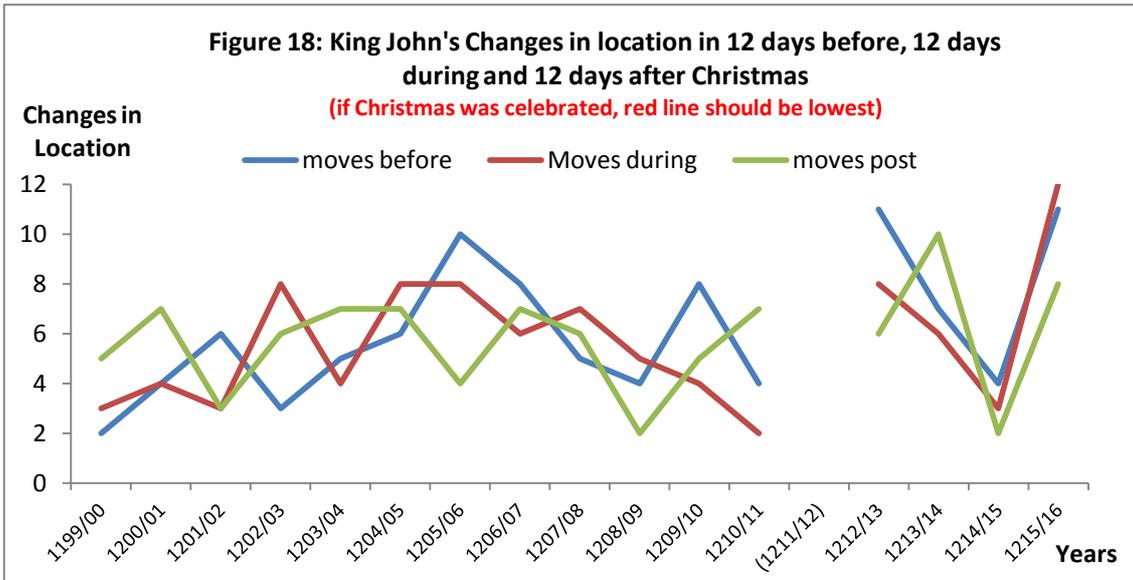
Graph of number of location changes during Lent (blue) and number during Easter (red) (y-axis) plotted against the year ( x-axis), showing that King John consistently made fewer journeys during Easter.



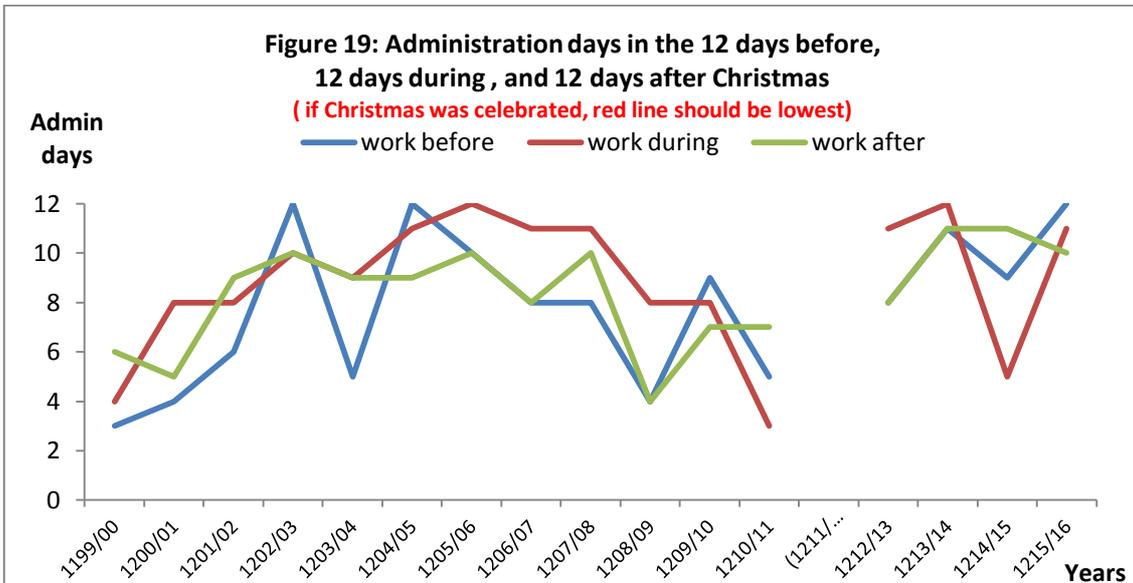
Graph of number of administration days during Lent (blue) compared to the number during Easter (red) (y-axis) plotted against the year (x-axis), showing a variable pattern.

- **Christmas**

Likewise, if the twelve days of Christmas had been celebrated then it should have been different from the preceding and following 12 days. (See Figures 18 and 19) Compared to the pattern for Lent/Easter, the observance of Christmas for both journeying and administration was found to be much more variable.



Graph of number of court moves before (blue), during (red) and after (green) Christmas plotted against the year (x-axis) showing a variable pattern.



Graph of number of administration undertaken by King John before (blue), during (red) and after (green) Christmas plotted against the year (x-axis) showing a variable pattern.

### ***3.4 Summary of Descriptive Analysis***

#### ***Primary Parameters***

The description of travelling activity demonstrated annual differences, whether displayed as calendar or regnal years. (Figures 4&5)

Statistical analysis using Spearman Rank two tailed test showed that there was a significant association between the documentary data and the source availability suggesting that the bimodal pattern reflects the pattern of survival of the sources that underpin the itinerary. Likewise an association was found between the pattern of documentary data and the annual distance that King John travelled. However, there is no obvious connection between these two parameters, unless the annual distances are being influenced by journey numbers, which are linked directly to the pattern of documentary data.

There was no evidence of an association between the documentary data and the variability of the regnal year length, suggesting that such slight changes in year length were not influential. Moreover, there was no association between travelling distance and the no-record days, suggesting that no-record days do not arise from the need to recover from journeying.

This means that the study analysis must be tested against the documentary data to determine the extent of any correlation between them i.e. whether the changes are arising from the patterns of change in the documentary data or are independent of them.

#### ***Secondary Parameters***

The descriptive analysis of the secondary parameters show a king who appears to have some regular habits e.g. starting journeys mostly at the end of the week (Wed-Fri). It is likely that the greater distance associated with these weekdays is a reflection of the greater number of journeys. Equally, the king's administration mirrors the start day of journeys, with Wednesday appearing to be the day of most change. Starting a journey on Sunday was nearly as common as on Saturday, with some annual variations, suggesting that the king did not consistently keep it as a day of rest. As expected, the king travelled most distance in summer, although it is perhaps surprising to find how much he travelled in winter and how little in Spring, perhaps reflecting external factors such as road conditions or rivers in spate. (Figure 12)

Analyses of other secondary parameters note that aging does not appear to be a significant factor in King John's travelling; that, as the "crown estate" was so extensive, it was unlikely that this would have accounted for significant diversions and therefore changes in the

itinerary; and that King John consistently avoided travelling during the Easter Season ( Easter Sunday to Ascension Day) in contrast to his variability at Christmas. Further details of more general interest e.g. maps describing geographical variables are presented in Appendix 5.

This means that King John shows evidence of habit and consistency and therefore unusual activity or inactivity might evoke comment in the historical record.

## **Chapter 4 Mathematical Modelling**

This chapter describes how the prepared data was analysed and summarizes their findings. It then tests the results to ensure that their validity.

- 4.1 Change Point Analysis: methodology
- 4.2 Change Point Analysis: results
- 4.3 Change Point Analysis: testing the model

### **4.1 Change Point Analysis: Method**

#### **Background**

King John's moderated activity score is a time based data set or time series i.e. where the parameter under investigation is plotted against time. Statistically significant changes in a time series are traditionally determined by using control charting.(Amiri and Allahyari, 2012) This takes a fixed sample size at regular intervals of time and plots the results against predefined bounds e.g. twice the standard deviation. A breach of such a bound would denote a significant finding ( $p < 0.05$ ). This process may be refined by using moving averages to smooth changes in the variable but the methodology is essentially predicated on the data being parametric.

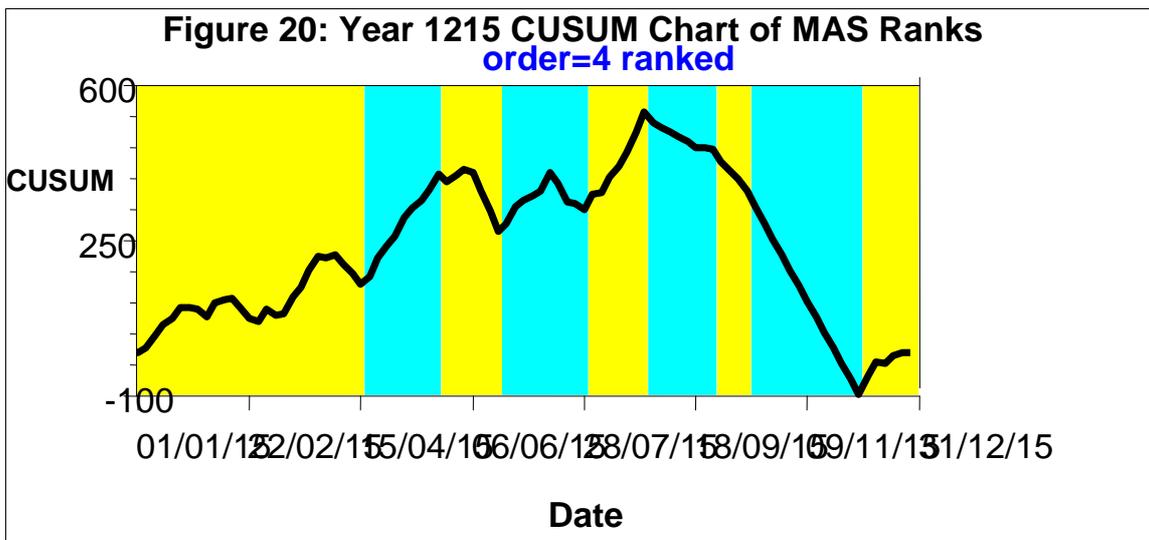
An alternative method, Change Point Analysis, was first described by ES Page in 1954 in response to concerns that *"rules based on moving averages are difficult to evaluate"*, and that, when using control charting *"there is a probability of one that some point will eventually fall outside the limits and action will then be taken even where there is no change"*.(Page, 1954, Killick et al., 2012)

Page's work was further developed by DV Hinkley in 1971 who introduced cumulative sum charting (CUSUM). (Hinkley, 1971) This is the cumulative sum of the difference between the values and the average, and demonstrated by this example using a data set of 36 points:

- 1) The first point of the CUSUM chart is  $S_0$  and is allocated to be ZERO
- 2) The next point  $S_1$  is calculated using the formula  $= S_0 + (X_1 - \bar{X})$  when  $X_1$  is the first data point and  $\bar{X}$  is the average of data set.
- 3) The next point  $S_2$  is calculated  $= S_1 + (X_2 - \bar{X})$  because this is a cumulative exercise
- 4) The last point  $S_{36} = S_{35} + (X_{36} - \bar{X}) = \text{ZERO}$

When  $S_1$  to  $S_{36}$  are plotted against time they produce a graph that begins and ends on zero. When the CUSUM graph line is horizontal, this indicates that there is no change in the data average; when the CUSUM graph line is rising then those data values are tending to be above

average and likewise when the graph is falling the data values are below average. More importantly, a change in direction of the CUSUM graph line (i.e. a change from rising to falling or vice versa) denotes a change in the average and therefore a statistical change in the data set. An example of a CUSUM chart is shown in Figure 20 and which is taken from the analysis of Year 1215 of King John's travelling. This plots the CUSUM results as a black line showing upward and downward movements. The changes in background colour show the significant change in direction of the CUSUM graph line, as identified by the Change Point Analyzer™.



Graph of CUSUM (y-Axis) plotted against date ( x-axis) showing the CUSUM line (black) and significant changes in CUSUM where the background colour changes.

Illustration courtesy of Change Point Analyzer™(Taylor, 2000)

This however does not indicate whether such changes are statistically significant. Hinkley resolved this issue when, in 1987 with Edna Schechtman, they applied a bootstrapping method to the Change-point model. They also tested their new model on both parametric and non parametric data and found that *"the agreement is quite good"*. (Hinkley and Schechtman, 1987) Bootstraps are random re-orderings of the data which are analysed by calculating the magnitude of change for each re-ordering i.e. the difference between maximum and minimum value. In a CUSUM data set, the magnitude of change in the bootstraps is expected to be smaller than the original as the bootstraps tend towards zero. In other words, they are less likely to have sequential values above (graph rising) or below (graph falling) the average. A percentage confidence level can be then be calculated as the number of bootstraps found to have a magnitude larger than the original divided by the total number of bootstraps and multiplied by 100 e.g. if 50 bootstraps out of 1,000 were greater than the original =

$(50/1000) \times 100 = 5\%$  confidence level or a probability ( $p$ ) of 0.05. So "[b]ootstrapping results in a distribution free approach with only a single assumption, that of an independent error structure", where an independent error structure says that there are no inherent trends or relationships within the data (see below).(Taylor, 2000)

### **Change Point Analyzer™**

In 2000, WA Taylor founded *www.variation.com* which develops programs and training based on change point analysis.(Taylor, 2000) This section describes the mathematical tools that are used in his Change Point Analyzer™, how they handle the data and the implications for this study:

- cumulative sum charting (CUSUM)
- bootstrapping
- ranking
- statistical smoothing
- mean square error

The principles of CUSUM and bootstrapping have been described already in the previous section. Ranking data is when the data is arranged in ascending order of magnitude and each data point allocated a ranking number. These ranking numbers are then analysed by the program for changes in the sequence. Ranking is an established statistical methodology that reduces the influence of outliers on subsequent analysis.(Corder and Foreman, 2009)

Smoothing, or moving averages, is a recognised statistical technique to deal with non compliance of the only program assumption in the Change Point Analyzer™ – that of an independent error structure (see above). Patterns of change fall into two categories – "*negatively correlated*" data occurs when, if the first value is above the average then the next will be below it, and vice versa, and ongoing – giving rise to an artificial see-saw pattern which may mask true changes (false negatives). "*Positively correlated*" data – when if the first data point is above the average, then the next is also above average and ongoing – risks identifying changes that are not real (false positives). Both "*negative and positive correlations*" may be eliminated by using moving averages but which has the effect of smoothing the time line.

The date of change is estimated by using Mean Square Error (MSE) where the mean of the data leading up to a change is compared to the mean of the data following the change. This process is repeated using different dates around the likely change time, with the date that produces the least difference between the mean value before and the mean value after, taken to be the most likely candidate date.

Finally, the Analyzer program performs an iterative process by re-examining previously identified changes when other changes are found, until all changes not only comply with the program requirements, but also with each other. This means that the program continuously checks its findings to ensure that all the identified changes are real and meet statistical significance. The Analyzer program was accredited by the Food and Drug Administration (US) in 2003 for use in pharmaceutical research and development, and has been used in other medical research.(Cram et al., 2003, Cassidy et al., 2002, Foffani et al., 2005)

### **Example**

Change Point Analyzer™ produces 4 types of output:

1. Time series graph
2. Table of significant changes
3. Table of significant changes in standard deviation
4. Confirmation of Program assumptions

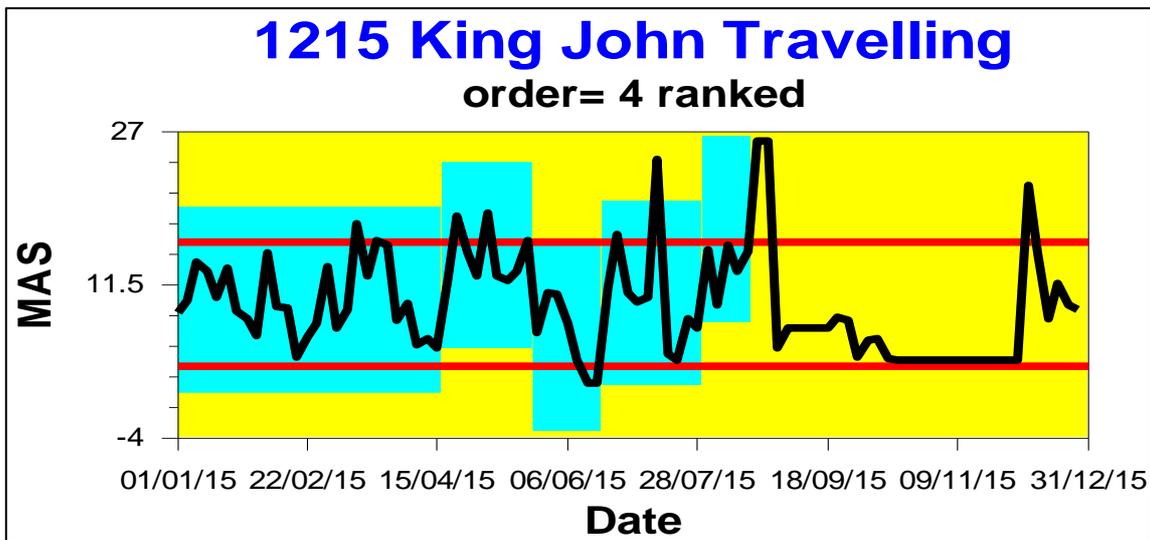
To demonstrate these outputs, the Year 1215 is presented as an example.

### **Output 1 (Figure 21)**

Figure 21 demonstrates output 1 for Year 1215 with the time series results as a black line and the turquoise bands representing  $\times 2$  standard deviations. The shifts up and down of the turquoise blocks indicate the significant changes in the data that have been identified by CPA and demonstrate the points in time when these changes occurred. The red bounds are program control limits which when breached, also suggest a significant movement. However this is predicated on a parametric distribution and therefore is not reliable for King John's travelling data.

The title shows that this analysis required a smoothing order of 4 which was the smallest value that would ensure compliance with the program assumptions. This was an incremental process where sequential analyses were re-set and re-run with increasing smoothing orders until the program indicated that compliance had been achieved. Likewise, the analysis was simultaneously ranked to accommodate outliers, again in order to ensure compliance with the program assumptions.

Figure 21: Change Point Analysis graph for King John's travelling 1215 (MAS)



Graph of moderated activity score(MAS) for King John's travelling during 1215 (y-axis) plotted against date (x-axis) showing actual changes in MAS (time series, black); movements of two standard deviations denoting statistically significant changes(turquoise bands) and program control limits (red). Illustration courtesy of Change Point Analyzer™

#### Output 2 & 3 (Tables 3 & 4)

Tables 3 and 4 show both significant changes in moderated activity score and changes in the standard deviation. Considering both tables, the columns from left to right show

- the *date* that directly follows the identified change
- the *confidence interval* or window of change (@95% certainty)
- *Confidence level* or ranking of changes relative to each other (@>90%)
- *From and To\** - the actual integer of change
- *Level* - a quick reference and visual indication of ranking of changes relative to each other, similar to Confidence level

#### Output 4 (Table 5)

Table 5 marks the confirmation that the analysis complies with the program assumptions and that the results are meaningful.

This example therefore shows how the CPA program identifies the date and scale of the significant changes in King John's travelling (MAS). By using the date difference between each change, the investigation derived the period duration of unchanging or similar levels of activity by King John and the MAS value during each period (*To*)\*, which became the measure of his activity at that time.

**Table 3: Change Point Analysis: Significant Changes for King John 1215 (MAS) Courtesy of Change Point Analyzer™**

<b>Table of Significant Changes for MAS</b>					
Confidence Level for Candidate Changes = 50%, Confidence Level for Inclusion in Table = 90%, Confidence Interval = 95%, Bootstraps = 1000, Without Replacement, MSE Estimates, Analyze Ranks					
Date	Confidence Interval	Conf. Level	From	To	Level
19/04/15	(14/02/15, 19/04/15)	94%	9.8839	14.329	4
25/05/15	(25/05/15, 06/06/15)	100%	14.329	6.0321	3
22/06/15	(02/06/15, 24/07/15)	94%	6.0321	10.582	6
01/08/15	(26/06/15, 09/08/15)	95%	10.582	17.054	6
29/08/15	(25/08/15, 29/08/15)	99%	17.054	7.1053	3
30/09/15	(22/09/15, 30/09/15)	98%	7.1053	4.9944	6
16/10/15	(16/10/15, 16/10/15)	100%	4.9944	3.85	3
07/12/15	(07/12/15, 07/12/15)	100%	3.85	12.327	2

**Table 4: Change Point Analysis: Significant Changes in Standard Deviation for King John 1215 (MAS). Courtesy of Change Point Analyzer™**

<b>Table of Significant Changes for MAS Standard Deviation</b>					
Confidence Level for Candidate Changes = 50%, Confidence Level for Inclusion in Table = 90%, Confidence Interval = 95%, Bootstraps = 1000, Without Replacement, MSE Estimates, Analyze Ranks					
Date	Confidence Interval	Conf. Level	From	To	Level
21/08/15	(10/06/15, 24/10/15)	100%	3.1451	0	1

**Table 5: Confirmation of Program assumptions. Courtesy of Change Point Analyzer™**

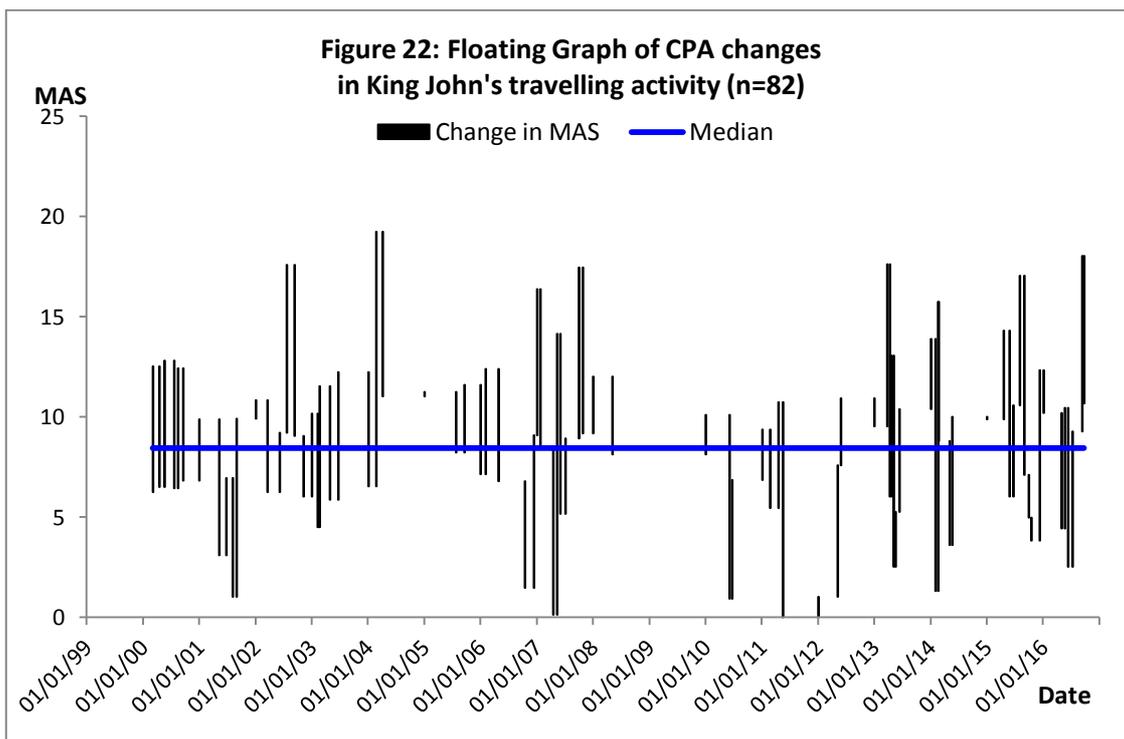
**Assumptions Verified**

No departure from any of the assumptions was found.

## **4.2 Change Point Analysis: Results**

The analysis used the retro-imputed data set for each calendar year, where sea travel was ascribed a zero value to reflect that, although the king was travelling, he had little direct control over his speed. The program identified 82 statistically significant changes in King John's travelling activity during the years 1200 – 1208 and 1210 – 1216 i.e. no changes were found in 1199 (10.2MAS) and 1209 (7.9MAS). These constituted 83 identified periods that encompassed 91.8% of the days of King John's reign accounting for all dates during 1200 – 1208 and 1210 – 1216.

The patterns of changes in King John's travelling activity are demonstrated graphically using floating graphs. (Figure 22) **Floating graphs** show the change (MAS) identified by CPA (MAS From; MAS To) as a vertical line plotted against the date of change and mathematically centered around the median. This allows the scale of change (MAS) to be shown as the height of the line but not the direction of change i.e. whether from 1MAS to 10MAS or vice versa. By plotting changes against the median, higher than "normal" activity is seen above the median and lower than "normal" activity below the median. This relationship to "normal" activity as indicated by the median value, is an important reference in bipolar activity. Equally, when the change line stops at the median, it is equivalent to a unipolar change; when it continues through the median to the opposite pole, it is equivalent to a swing in activity. Finally, the graph demonstrates the significant changes as they occur in time, over the duration of King John's reign.



*Floating graph of Moderated Activity Score (y-axis) plotted against date (x-axis) showing the all graphable changes in King John's activity, their occurrence, scale and relationship to median.*

*This shows the change (MAS) identified by CPA as a vertical line plotted against the date of change and mathematically centered around the median. It demonstrates the **scale of change (MAS)** using the height of the line; **the type of activity** (above or below "normal" (median)); **the type of change** ( if the change line stops at the median, it is equivalent to a unipolar change; when it continues through the median to the opposite pole, it is equivalent to a polar swing), and **the timing of significant changes** over the duration of King John's reign.*

Application of the definitions and inclusion/exclusion criteria described in Sections 3.2.2 and 3.2.3 allowed the identification of the ICD-10 compliant periods and ones that had acceptable internal uncertainty. This found

- 5 periods that had changes within the median band and were therefore excluded from the analysis;
- 3 periods that did not comply with the clinical inclusion criteria
- 16 periods that had excessive uncertainty ( $\geq 34.5\%$ ).

Exact details are provided in Table 6; Figure 23 shows the pattern of exclusion on the basis of uncertainty during the reign.

**Table 6: Excluded CPA periods (n=24)**

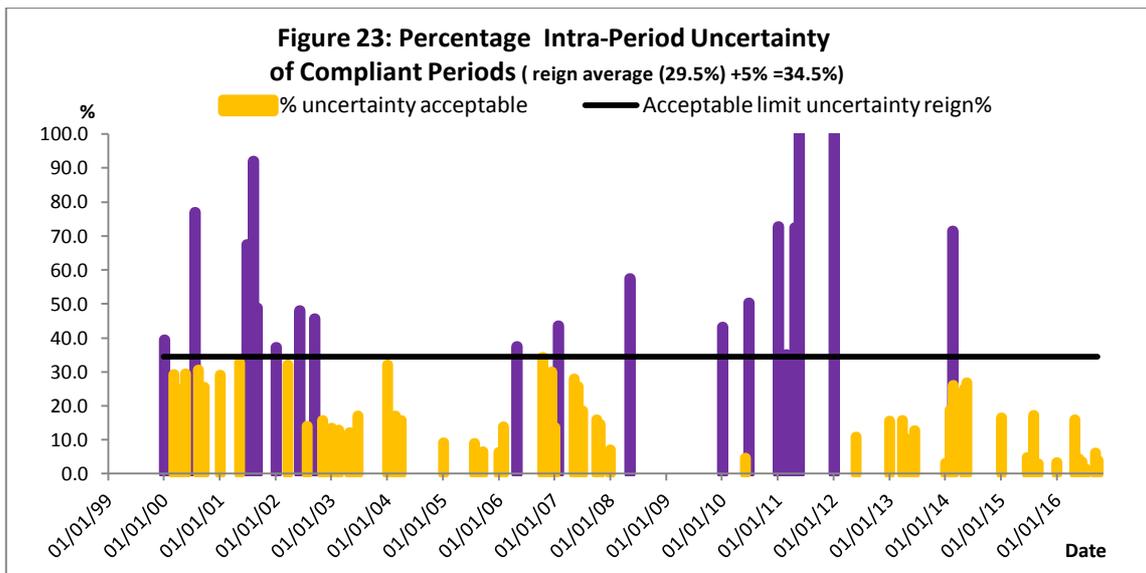
Period MAS within median band			
	Date from	Date to	MAS
1	24/7/05	16/9/05	8.2
2	22/1/07	16/4/07	8.4
3	3/7/07	1/10/07	8.9
4	4/5/08	31/12/08	8.1
5	21/2/14	4/5/14	8.8

Non compliant ICD-10 Periods:					
	Date from	Date to	MAS	HIGH Duration (days)	LOW duration (days)
1	06/02/03	18/02/03	4.50		13
2	11/04/13	17/04/13	6.04		7
3	05/05/13	15/05/13	2.53		11

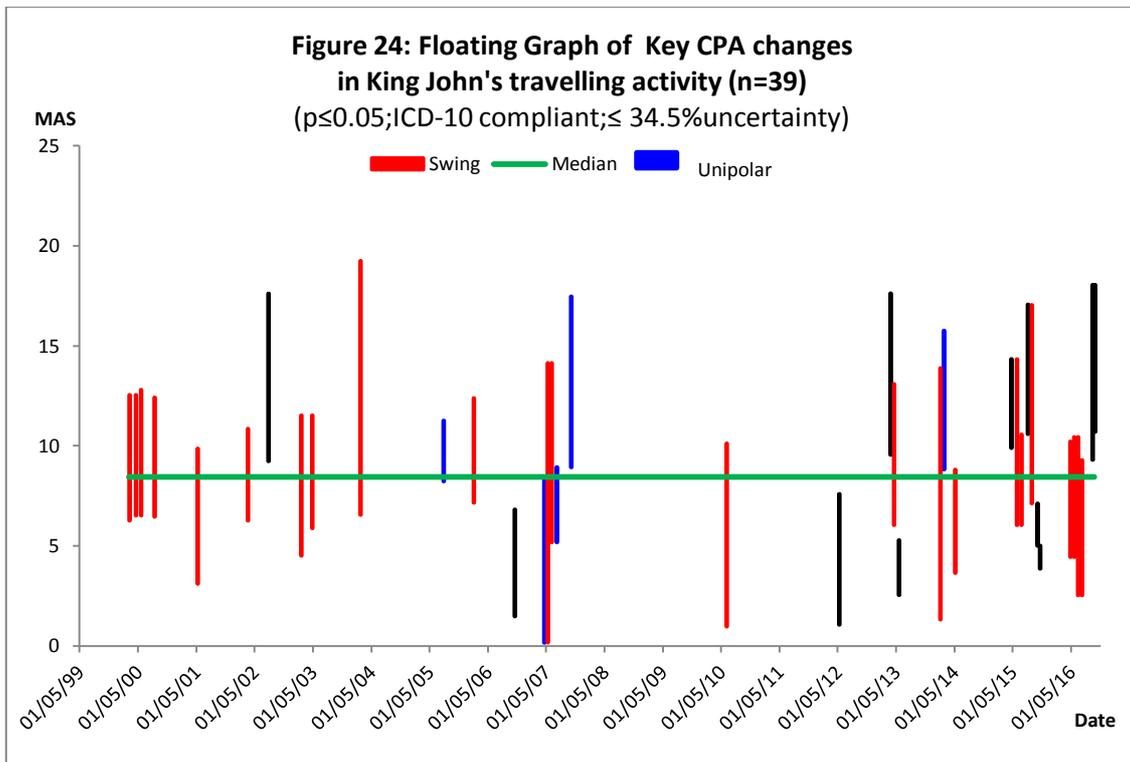
Periods with excessive uncertainty:						
	Date from	Date to	MAS	HIGH duration (days)	LOW duration (days)	% uncertainty
1	01/01/00	06/03/00	6.26		66	39.39
2	19/07/00	13/08/00	6.45		26	76.92
3	24/06/01	05/08/01	6.97		43	67.44
4	05/08/01	29/08/01	1.04		25	92.00
5	29/08/01	31/12/01	9.93	125		48.80
6	01/01/02	19/03/02	10.86	78		37.18
7	10/09/02	05/11/02	9.07	57		45.61
8	26/04/06	13/10/06	6.80		171	37.43
9	01/01/10	02/06/10	10.12	153		43.14
10	22/06/10	31/12/10	6.86		193	50.26
11	01/01/11	22/02/11	9.38	33		72.73
12	22/02/11	19/04/11	5.46		77	35.06
13	19/04/11	17/05/11	10.73	29		72.41
14	17/05/11	31/12/11	0.00			100.00
15	01/01/12	06/05/12	1.05			100.00
16	15/02/14	21/02/14	15.75	7		71.43



*Histogram of percentage uncertainty within each CPA identified period (y-axis) plotted against date (x-axis) showing the 19 periods (purple) with excessive intra-period uncertainty ( $\geq 34.5\%$ ). This shows that the excluded periods are distributed across the reign and can loosely be grouped around 1202, 1207 and 1211.*

#### 4.2.1 Patterns of Change: life time presentation

Figure 24 presents the most robust or key clinical CPA changes (n= 39) which are coloured coded for unipolar changes (movement to or from median, n=5) and swing changes (movement through median to opposite pole, n=24). These core clinical changes remain after all the definitions and inclusion/exclusion criteria have been applied, and when all periods with an arbitrary start (1 Jan) or end (31 Dec) have been excluded. This figure is comparable to Figure 2: (Post et al., 1988) showing *Figure 3: Median Course of Affective Illness in 82 Manic-Depressive Patients* ( Section 2.3, p 22), although Figure 24 is an individual example and Post *et al* are summarising changes in 82 patients. Despite this, both show a increasing number of larger changes between ages 35 and 40 (Yr 1201 and 1206). The data is comparable on the basis of current clinical thinking which says that mood and activity are inextricably linked in bipolar disorder.



*Floating graph of Moderated Activity Score (y-axis) plotted against date (x-axis) showing the key clinical changes in King John's activity, their occurrence, scale and relationship to median (swing or unipolar movement), being those that are statistically significant, clinically compliant, with acceptable levels of uncertainty, and excluding periods with arbitrary boundaries ie 1 Jan or 31 Dec. This shows the change (MAS) identified by CPA as a vertical line plotted against the date of change and mathematically centered around the median. It demonstrates the **scale of change (MAS)** using the height of the line; **the type of activity** (above or below "normal" (median)); **the type of change** ( if the change line stops at the median, it is equivalent to a unipolar change; when it continues through the median to the opposite pole, it is equivalent to a polar swing), and **the timing of significant changes** over the duration of King John's reign.*

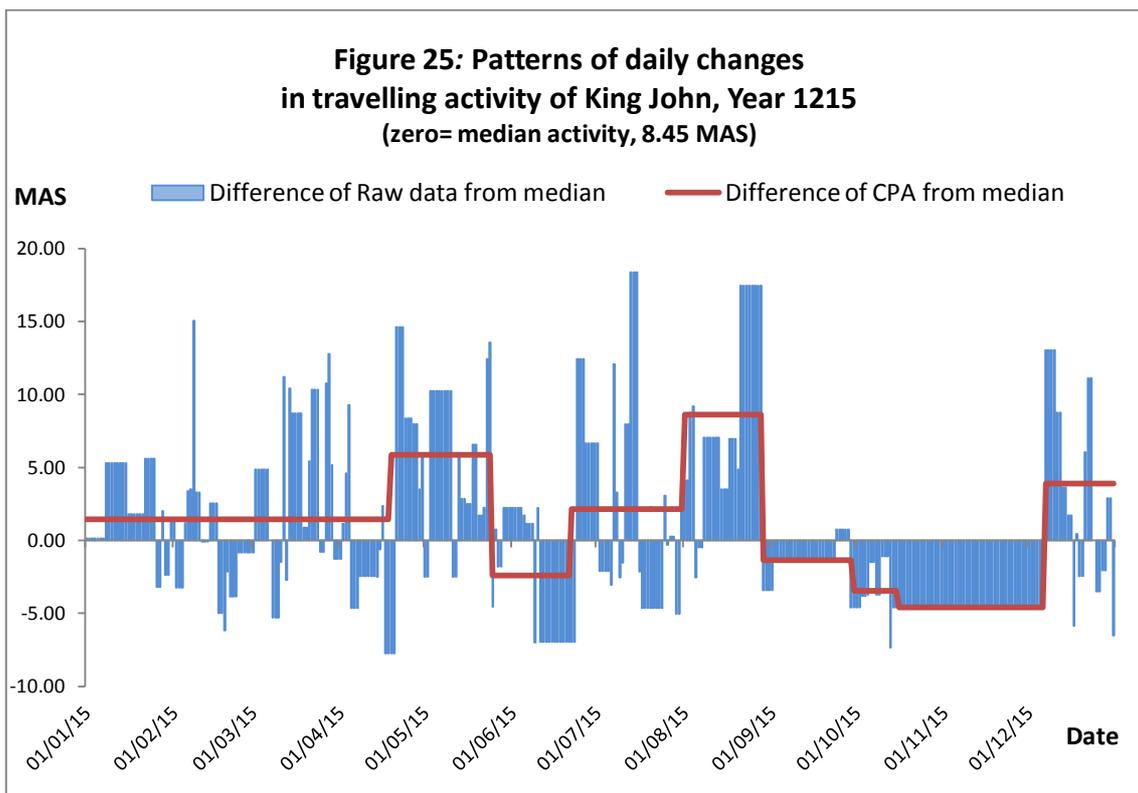
Tables 7 and 8 present the 59 CPA ICD-10 compliant periods of acceptable uncertainty (22 low; 37 high) that are the basis for further medical evaluation. They include periods with arbitrary start (1 Jan) and end (31 Dec) for reasons discussed in Section 4.3.2.

<b>Table 7: LOW PERIODS</b> ( $p \leq 0.05$ , ICD-10 compliant, acceptable uncertainty)				
<b>Period No.</b>	<b>Start (date)</b>	<b>End (date)</b>	<b>Period (MAS)</b>	<b>Duration (days)</b>
1	15/04/00	20/05/00	6.5	36
2	17/09/00	31/12/00	6.8	106
3	07/05/01	24/06/01	3.0	49
4	19/03/02	04/06/02	6.2	78
5	05/11/02	31/12/02	6.0	57
6	27/04/03	22/06/03	5.8	57
7	01/01/04	22/02/04	6.5	53
8	01/01/06	31/01/06	7.1	31
9	13/10/06	12/12/06	1.4	61
10	16/04/07	10/05/07	0.1	25
11	03/06/07	03/07/07	5.1	31
12	02/06/10	22/06/10	0.9	21
13	06/05/12	26/05/12	7.5	21
14	15/05/13	12/06/13	5.2	29
15	31/01/14	15/02/14	1.3	16
16	04/05/14	19/05/14	3.6	16
17	25/05/15	22/06/15	6.0	29
18	29/08/15	30/09/15	7.1	33
19	30/09/15	16/10/15	4.9	17
20	16/10/15	07/12/15	3.8	53
21	27/04/16	21/05/16	4.4	25
22	11/06/16	08/07/16	2.5	28

<b>Table 8: HIGH PERIODS</b> ( $p \leq 0.05$ , ICD-10 compliant, acceptable uncertainty)				
<b>Period No.</b>	<b>Start (date)</b>	<b>End (date)</b>	<b>Period (MAS)</b>	<b>Duration (days)</b>
1	06/03/00	15/04/00	12.5	41
2	20/05/00	19/07/00	12.8	61
3	13/08/00	17/09/00	12.4	36
4	01/01/01	07/05/01	9.8	127
5	04/06/02	23/07/02	9.23	50
6	23/07/02	10/09/02	17.6	50
7	01/01/03	06/02/03	10.1	37
8	18/02/03	27/04/03	11.5	69
9	22/06/03	31/12/03	12.2	193
10	22/02/04	02/04/04	19.2	41
11	02/04/04	31/12/04	11.0	274
12	01/01/05	24/07/05	11.2	205
13	16/09/05	31/12/05	11.5	107
14	31/01/06	26/04/06	12.3	86
15	12/12/06	31/12/06	9.0	20
16	01/01/07	22/01/07	16.3	22
17	10/05/07	03/06/07	14.1	25
18	01/10/07	25/10/07	17.4	25
19	25/10/07	31/12/07	9.1	68
20	01/01/08	04/05/08	12.0	125
21	26/05/12	31/12/12	10.9	220
22	01/01/13	24/03/13	9.5	83
23	24/03/13	11/04/13	17.6	19
24	17/04/13	05/05/13	13.0	19
25	12/06/13	31/12/13	10.4	203
26	01/01/14	31/01/14	13.8	31
27	19/05/14	31/12/14	10.0	227
28	01/01/15	19/04/15	9.8	109
29	19/04/15	25/05/15	14.3	37
30	22/06/15	01/08/15	10.5	41
31	01/08/15	29/08/15	17.0	29
32	07/12/15	31/12/15	12.3	25
33	01/01/16	27/04/16	10.2	118
34	21/05/16	11/06/16	10.4	22
35	08/07/16	09/09/16	9.2	64
36	09/09/16	24/09/16	18.0	16
37	24/09/16	19/10/16	10.6	26

#### 4.2.2 Patterns of Changes: daily presentation

The annual results were also presented in a comparable format to that published by Roy-Byrne and colleagues ( Figure 3, page 23) who demonstrated the "*Patterns of rhythmic alteration in manic depressive illness*" over a similar annual time period. (Roy-Byrne et al., 1985) The study took the data for 1215 as an example and, in similar fashion to Roy-Byrne and colleagues, used the median activity as an indication of normality and attributed a positive integer when activity was above the median (representing high activity) and vice versa. Figure 25 shows these changes: both Figure 25 and Figure 3 demonstrate similar small changes in the raw data within high and low periods. As before this comparison is made on the basis that activity and mood change synchronously in bipolar disorder. Equally, some of these changes - whether by King John or Roy-Byrne's patients - may have arisen from circumstances rather than bipolar disorder. This distinction of causation or aetiology, is explored in Chapter 6.



*Graph of Moderated Activity Score (MAS) rendered as positive integer if above median 8.45 MAS; negative integer if below median ( y-axis) (blue) and likewise CPA changes (red) plotted against date ( x-axis) showing patterns of rhythmic alterations similar to those presented by Roy -Byrne et al 1985.*

### **4.3 Change Point Analysis: testing the model**

The study raised five questions to test the CPA methodology and the identification of the CPA periods:

- 4.3.1 Are the identified changes a reflection of the sources or the missing data?**
- 4.3.2 Do the changes look like bipolar periods?**
- 4.3.3 Are changes just seen in travelling?**
- 4.3.4 Are the changes an anomaly of the CPA program?**
- 4.3.5 Is it just King John or seen in others?**

#### **4.3.1 Are the identified changes a reflection of the sources or the missing data?**

Two potential influences of change in King John's itinerary are considered:

- (1) the patterns of survival of the sources
- (2) the uncertainty arising from no-record days

Together they account for all the days of the itinerary because each day is either supported by documentation citing the king's location or it is a "no-record" day.

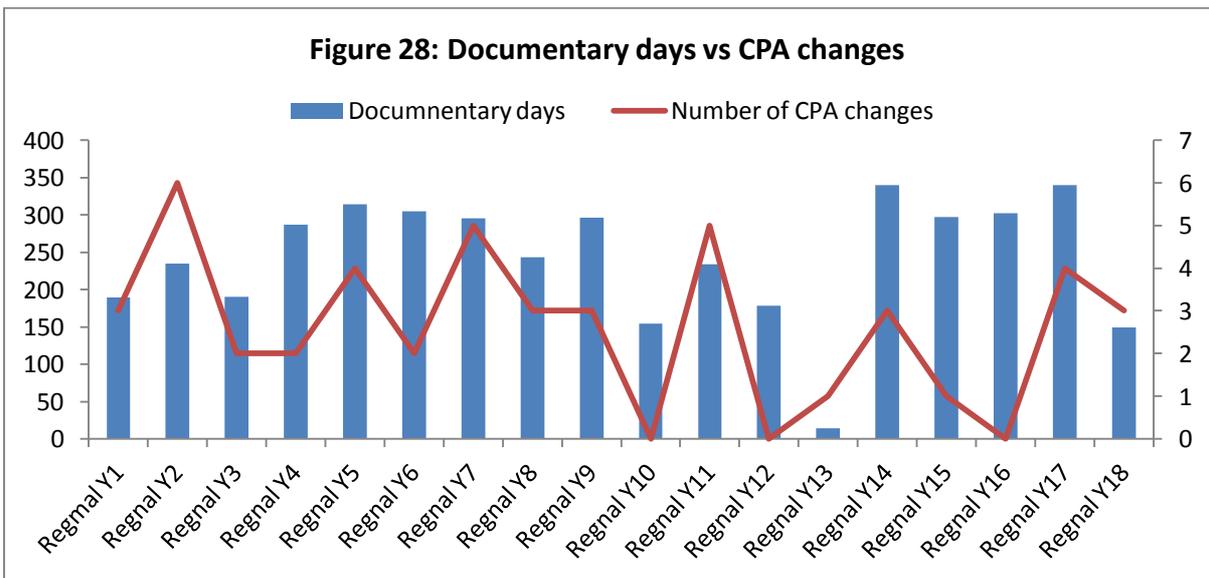
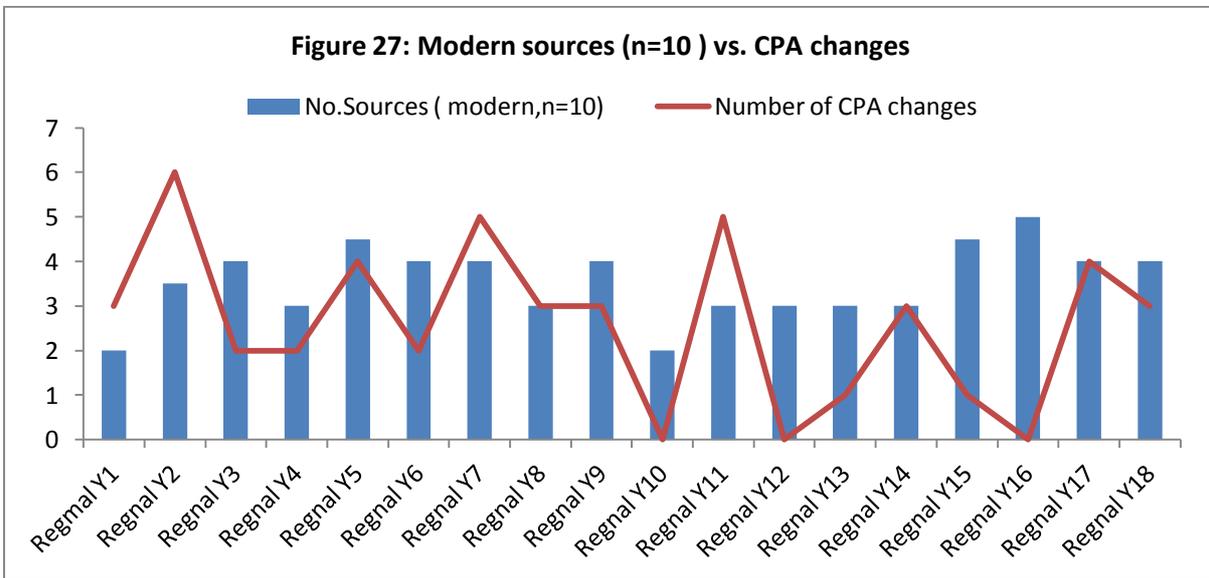
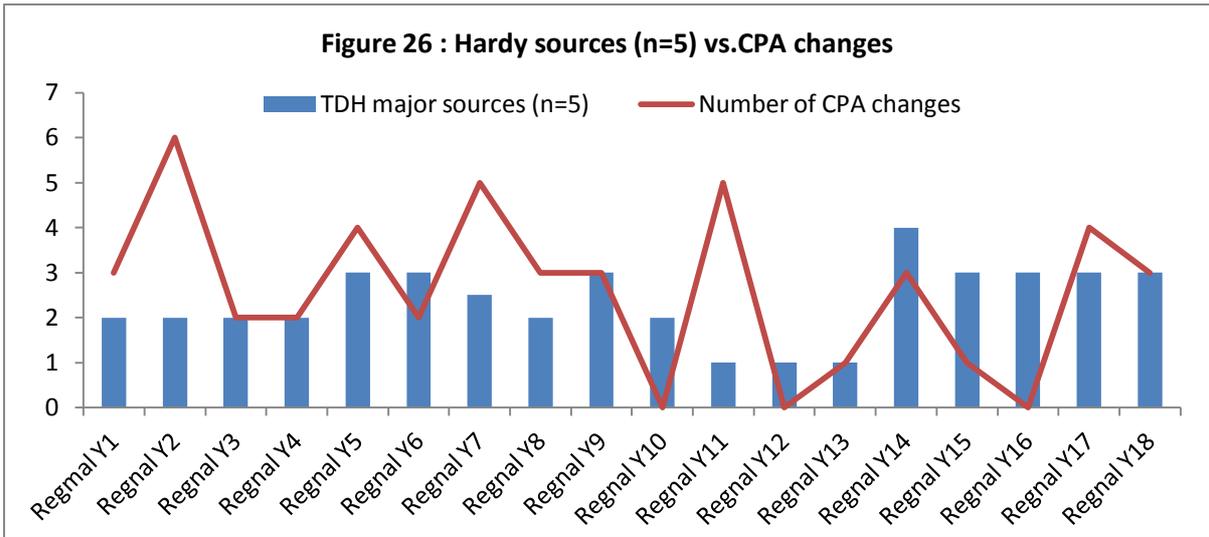
#### **(1) Evaluation of the influence of the sources**

Following the method used in the descriptive analysis (pp 64–66) a similar analysis compared the estimates of the sources against the changes found by CPA per regnal year. Their results are presented in a similar manner in Figures 26 ,27 and 28.

The Spearman Rho (two tailed) test showed that there was no statistically significant association between the number of changes identified by CPA for each regnal year (n=47) and

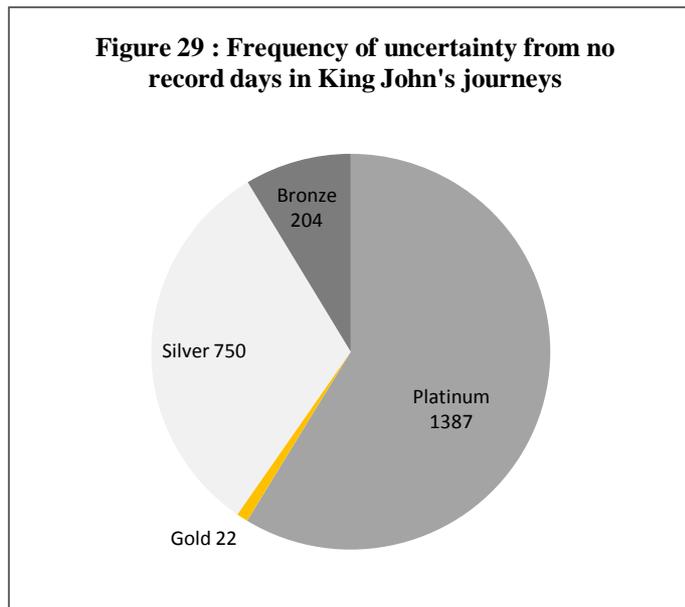
- the estimated number of Hardy's sources (n=5) (R=0.11 @p=0.65)(see Figure 26)
- the estimated number of modern sources (n=10) (R=0.07 @p=0.79) (see Figure 27)
- the documentary days from the itinerary (n=4,362) (R=0.26@p=0.29) (see Figure 28)

These results stand in contrast to the findings of the descriptive analysis which showed a significant association between the documentary days and distance. (see Section 3.3.1(2)p67) This means that changes identified by Change Point Analysis are independent of the documentary sources.



## (2) Evaluation of the influence of the missing data: Uncertainty

To quantify the uncertainty, each journey was classified according to their relationship with "no record days". (See Table 9) Of the 2,363 journeys analysed, 58.7% had no uncertainty ("platinum journeys") and only 8.6% had maximal uncertainty ("bronze journeys" - when neither the location 24h before or 24h after is known) (Figure 29 )



To evaluate the influence of uncertainty, two comparative analyses were performed. The first compared the distribution and median of the different journey groups using Kruskal-Wallis (KW) and Independent Samples Median tests (ISM) respectively, with pair wise comparison in view of unequal sample sizes. The analysis did not show any statistical difference in distribution (KW: 0.392 @ p=0.05) or median (ISM: 0.261 @ p=0.05).

*Pie chart showing the relative frequency of journeys, grouped according to uncertainty showing that 58.7% had no uncertainty (platinum data) and 8.6% had most uncertainty(bronze data)*

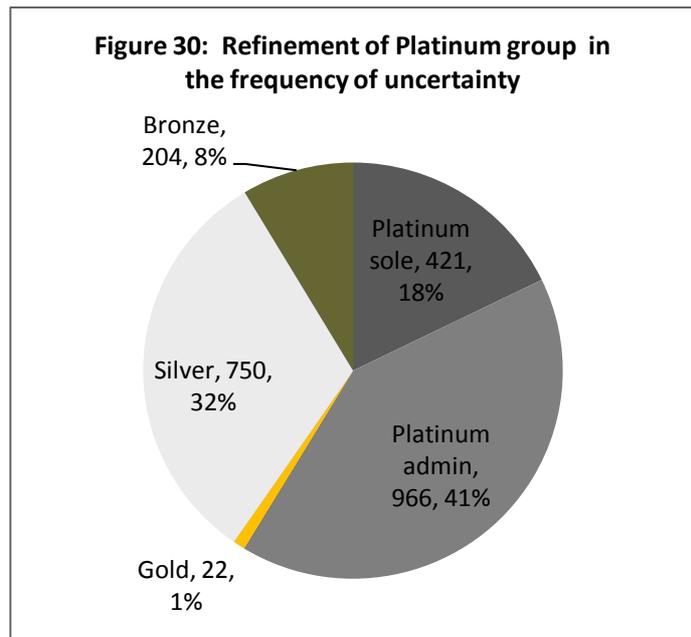
**Table 9: Data sets of Increasing Uncertainty**

Data Class	Description	Median
PLATINUM	Any journey where there is no uncertainty	8.7
GOLD	Any journey where the immediate location 24h before AND 24h after is <i>both</i> known but may include blank days during journey time	7.8
SILVER	Any journey where <i>either</i> the location 24h before or 24h after is known but <i>not both</i>	8.4
BRONZE	Any "singleton" journey where <i>neither</i> the location 24h before or 24h after is known	7.65
ALL	ALL journeys	8.45

The second comparative analysis made a further refinement with the Platinum group being subdivided into journeys where the dates between arrival and departure contained administration days (Platinum admin., n=966) and those which were "back-to-back" journeys (Platinum sole, n=421). (Figure 30)

An index was calculated to allow comparison between the groups: the number of changes identified by Change Point Analysis per number of journeys in each data set is shown as a percentage in Table 10.

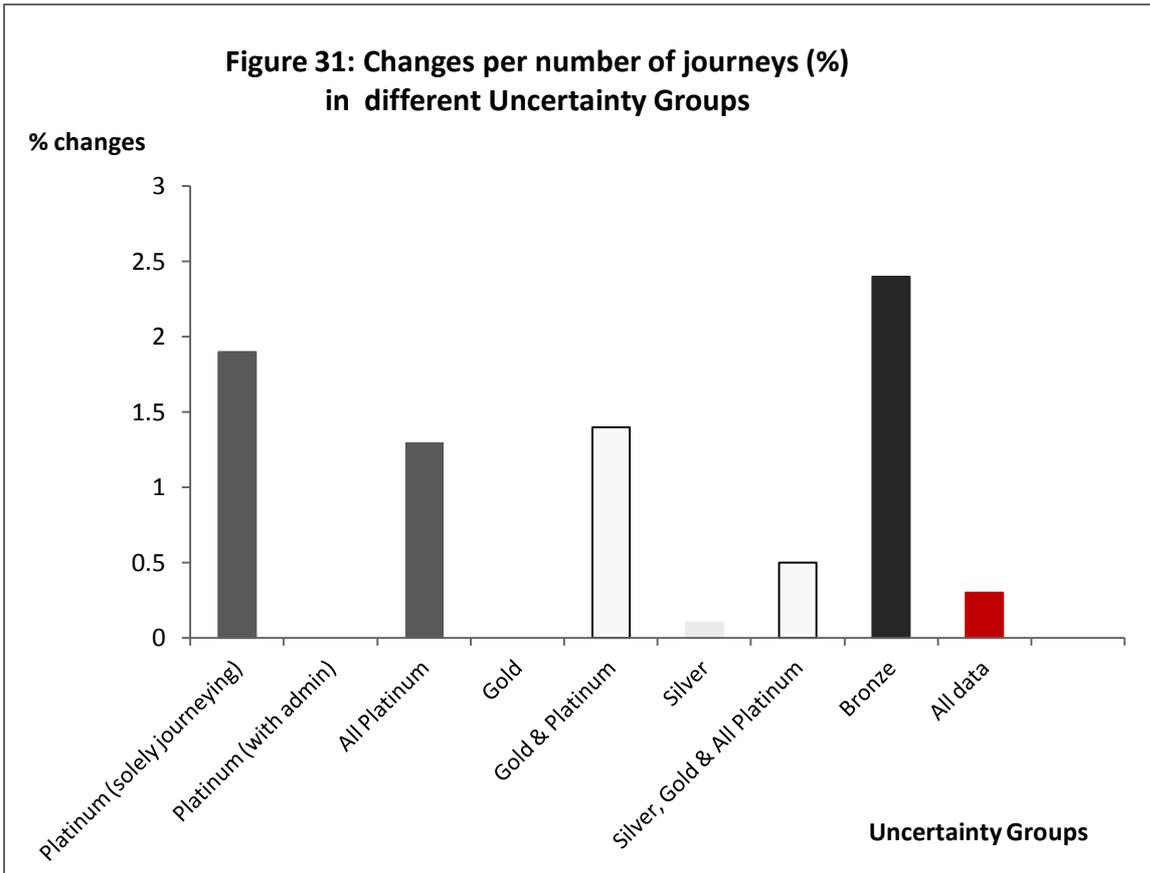
The index results were highest in the bronze data (2.4%) but next highest in the Platinum Sole (1.9%). Moreover, there was no evidence of a trend across the groups with increasing uncertainty (Figure 31). More importantly for the study, changes in the total data (0.3%) were among the lowest suggesting that the total data set was less likely to show changes and so any found were more likely to be real.



*Pie chart showing the relative frequency of journeys, grouped according to uncertainty showing a further breakdown of the Platinum group.*

**Table 10: Results of Change Point Analysis of Data of Increasing Uncertainty**

Data Class	Number of journeys (combination groups)	Number of Significant Changes identified by CPA (MAS)	Comparator Index Percentage of changes per number of journeys (%)
Platinum (solely journeying)	421	8	1.9
Platinum (with administration)	966	0	0
<b>All Platinum</b>	<b>1387</b>	<b>19</b>	<b>1.3</b>
Gold	22	0	0
<b>Gold and All Platinum</b>	<b>1409</b>	<b>20</b>	<b>1.4</b>
Silver	750	1	0.1
<b>Silver, Gold and All Platinum</b>	<b>2159</b>	<b>11</b>	<b>0.5</b>
Bronze	204	5	<b>2.4</b>
<b>All data</b>	<b>2363</b>	<b>8</b>	<b>0.3</b>



*Histogram of the changes identified by CPA as a percentage of the number of journeys (y-axis) plotted against the difference uncertainty groups showing no trend between groups and that all data (red) has a lower % change identification than five of the nine groups*

**4.3.1 Conclusions**

This investigation found that the changes identified by CPA were independent of the documentary sources and that the influence of the no-record days on the CPA analysis was small and unlikely to be statistically significant.

### ***4.3.2 Do the changes look like bipolar periods?***

The analyses present below examined the characteristics of the periods identified by CPA in order to establish if the study findings showed similar features to those published in the bipolar literature. The majority are related to period duration as this reflects the nature of the study. They are presented under five headings:

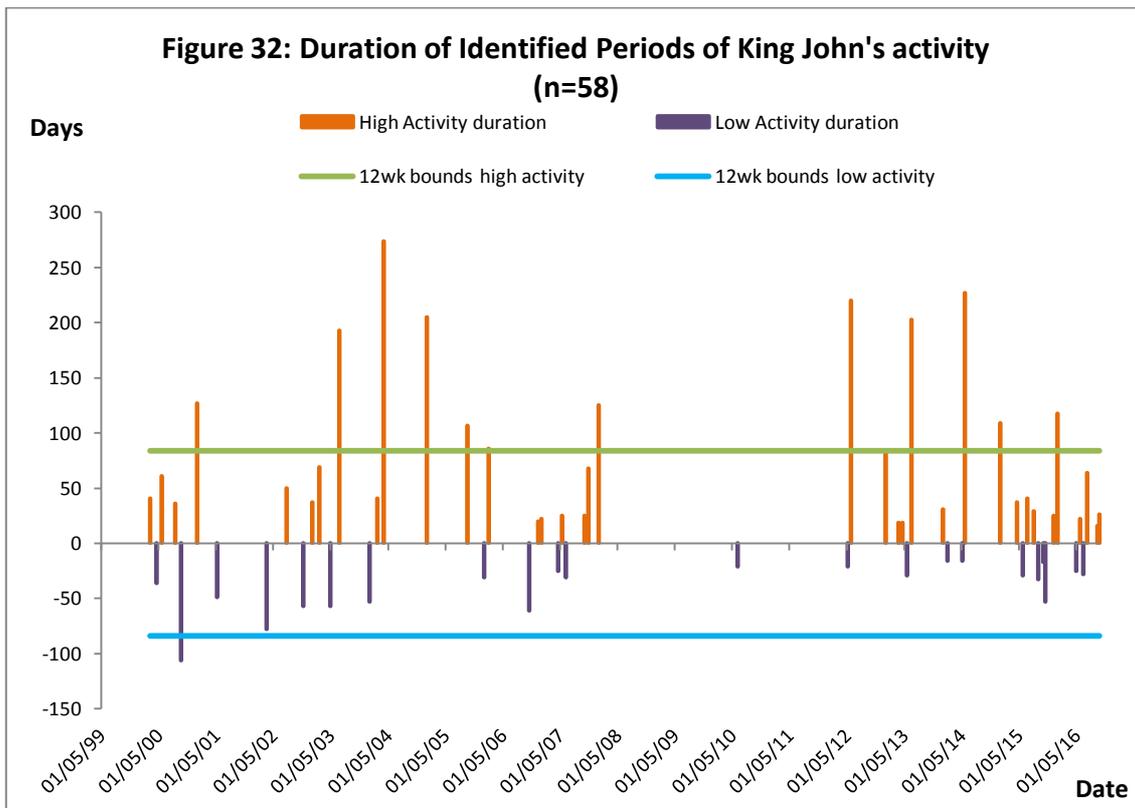
1. describing and comparing the identified vs. clinical periods
2. describing the intra-period duration
3. describing the inter-period duration
4. describing the patterns of changes in rapid cycling years
5. describing the patterns of changes as they relate to the seasons

This investigation used the 59 statistically significant and clinically compliant periods with acceptable uncertainty, that is the 83 periods identified minus the 24 excluded periods (Tables 7 and 8, pp 90, 91).

#### ***1. Analysis of Identified vs. Clinical periods***

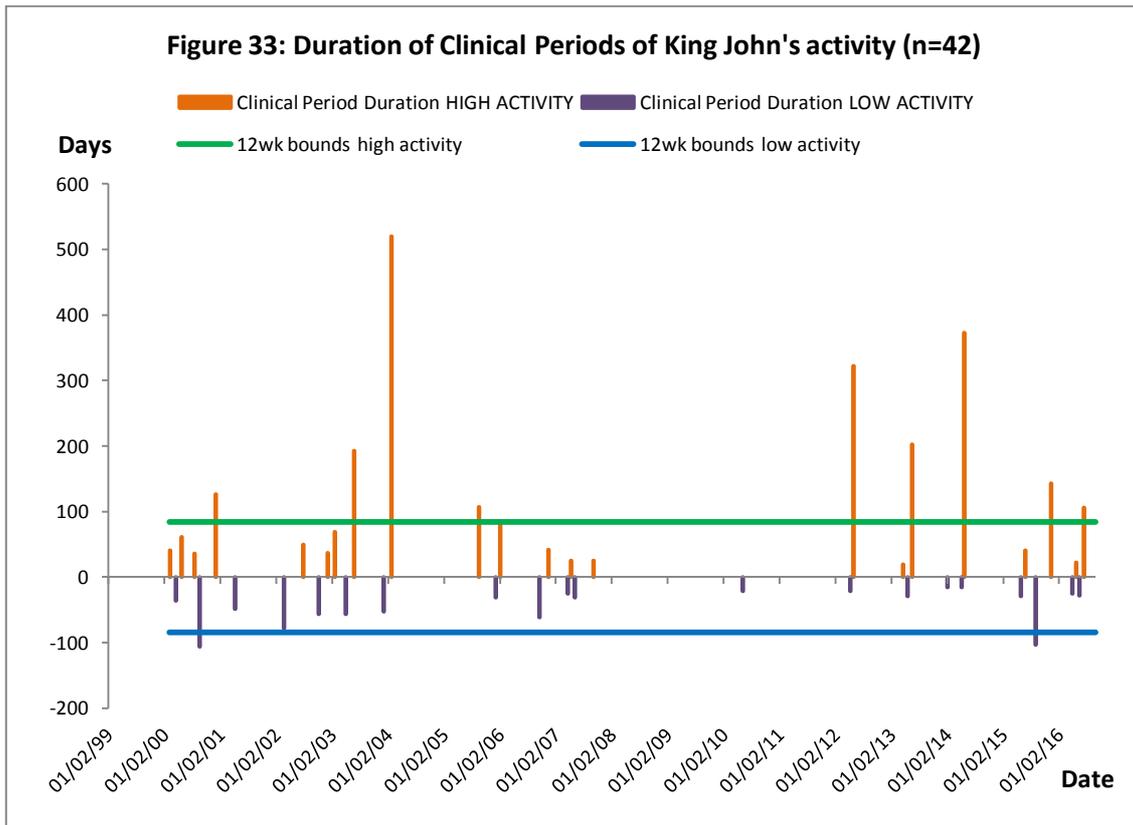
Before considering the analysis of the duration of activity, the role and influence of the periods starting on 1st Jan or ending on 31st Dec (n=22) was evaluated. Their inclusion in the study analysis promoted continuity within the time series which is of clinical importance but the arbitrary nature of their start or end might introduce an ascertainment bias. An analysis of the MAS values from previous year end to next year start i.e. moving directly from 31st Dec. to 1st Jan. (n=11), found that the polarity of activity did not alter on the majority of occasions (7/11 (64%); all high continuing high). The remaining occasions (n=4) were equally divided between change from high to low polarity or vice versa (2/11 (18%) high to low; 2/11 (18%) low to high). These findings suggested that on balance, any changes identified by using these periods were unlikely to introduce a significant number of false positive results. The study therefore included them in the analysis of duration of activity because of the clinical importance of continuity.

The periods encompassed 3,992 (62.8%) days of King John's reign (n=6,355) with 2,901 high days (45.6% reign); 872 low days (13.7% reign). These results are shown in Figure 32 and plotted against comparative 12wk clinical bounds for rapid cycling bipolar disorder. (Eaton et al., 1997). Low activity duration is displayed as a negative value solely for ease of interpretation. There appears to be more variation in the high periods than in the low and it is probable that circumstances, as opposed to possible bipolar disorder, may have driven or sustained some of these changes.



*Histogram of the duration (days) of identified periods of King John's activity, rendered positive if greater than median (orange) or negative if less than median activity (purple) and plotted against the date (y-axis) showing the pattern of occurrence and that some periods were in excess of 12wk clinical bounds for rapid cycling bipolar disorder.*

Where consecutive periods of similar polarity occur, these are summated to create an overarching clinical period. Forty two such periods were identified: 22 high activity; 20 low activity. Figure 33 demonstrates their collation of clinical periods, and is similarly plotted against the 12wk bounds suggested by Eaton and colleagues (Eaton et al., 1997). The same comments as above are equally applicable.



*Histogram of the duration (days) of clinical periods of King John's activity, rendered positive if greater than median (orange) or negative if less than median activity (purple) and plotted against the date (y-axis) showing the pattern of occurrence and that some periods were in excess of 12wk clinical bounds for rapid cycling bipolar disorder.*

A comparison of the statistics of the period duration of both identified periods and clinical periods is presented in Table 11. A statistical comparison of the distributions of the duration of high and low identified periods was made using the Mann Whitney U test and demonstrated a significant difference. (MWU: 0.036 @p=0.05) A similar significant difference was found between the duration of high and low clinical periods (MWU: 0.012 @p=0.05). A statistical comparison of the range of the duration of high and low periods showed a significant difference for both identified periods (Moses: 0.411 @p=0.05) and for clinical periods (Moses: 0.444 @p=0.05). This means that the high and low periods are mathematically different whether as identified periods, or as clinical periods.

**Table 11: Comparison of Statistics of Period duration**

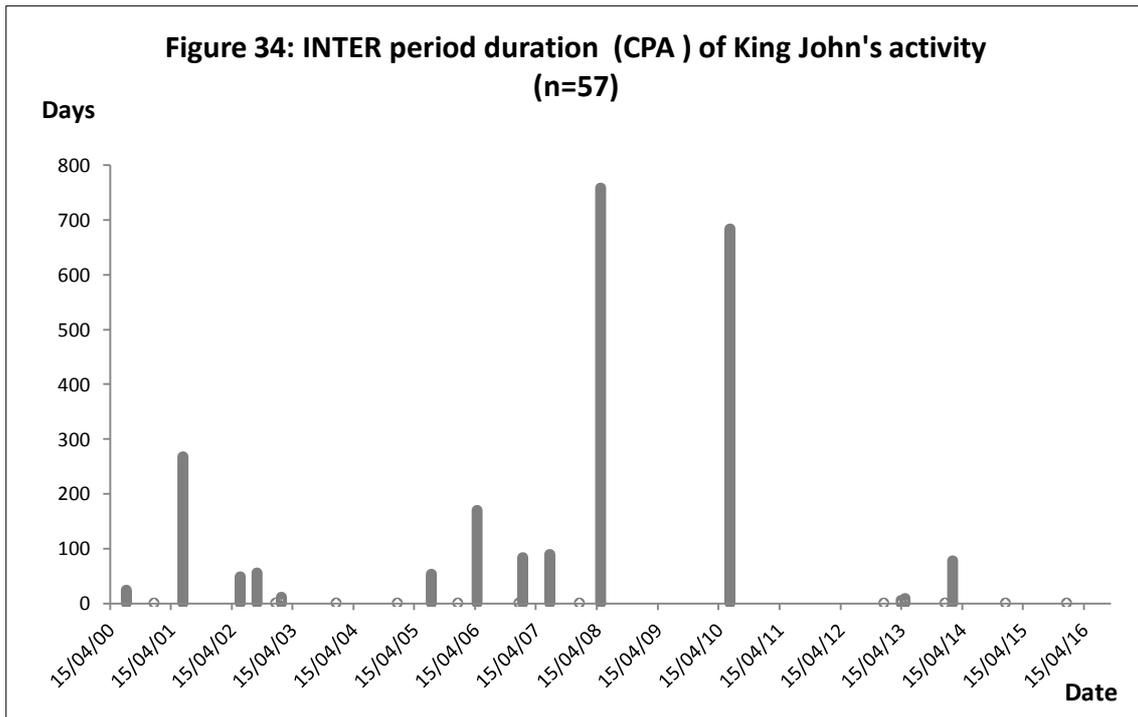
	High Activity Identified period duration	High Activity Clinical period duration	Low Activity Identified period duration	Low Activity Clinical period duration
<b>Mean</b>	80.5	120.3	39.6	43.6
<b>Standard Error</b>	11.9	27.9	4.8	5.9
<b>Median</b>	45.5	65	31	31
<b>Mode</b>	41	41	57	57
<b>Standard Deviation</b>	71.8	131.0	22.5	26.8
<b>Sample Variance</b>	5156.7	17165.4	509.5	719.3
<b>Kurtosis</b>	0.5	3.3	2.2	0.8
<b>Skewness</b>	1.2	1.9	1.4	1.2
<b>Range</b>	258	501	90	90
<b>Minimum</b>	16	19	16	16
<b>Maximum</b>	274	520	106	106
<b>Sum</b>	2901	2648	872	872
<b>Count</b>	36	22	22	20
<b>Confidence Level(95.0%)</b>	24.2	58.0	10.0	12.5

## ***2. Analysis of Intra-period duration***

Change Point Analysis was used to determine any significant changes in the duration of periods, whether identified or clinical. No significant changes in the duration of high activity periods, whether identified or clinical, were found over the length of King John's reign. One significant change was found in the duration of low activity period and in both identified and clinical data sets: a significant decrease on 16 April 1207 in the duration of the identified low periods compared to a similar change on 1 Jan 1206 in the analysis of the duration of clinical low periods.

### 3. Analysis of Inter - period duration

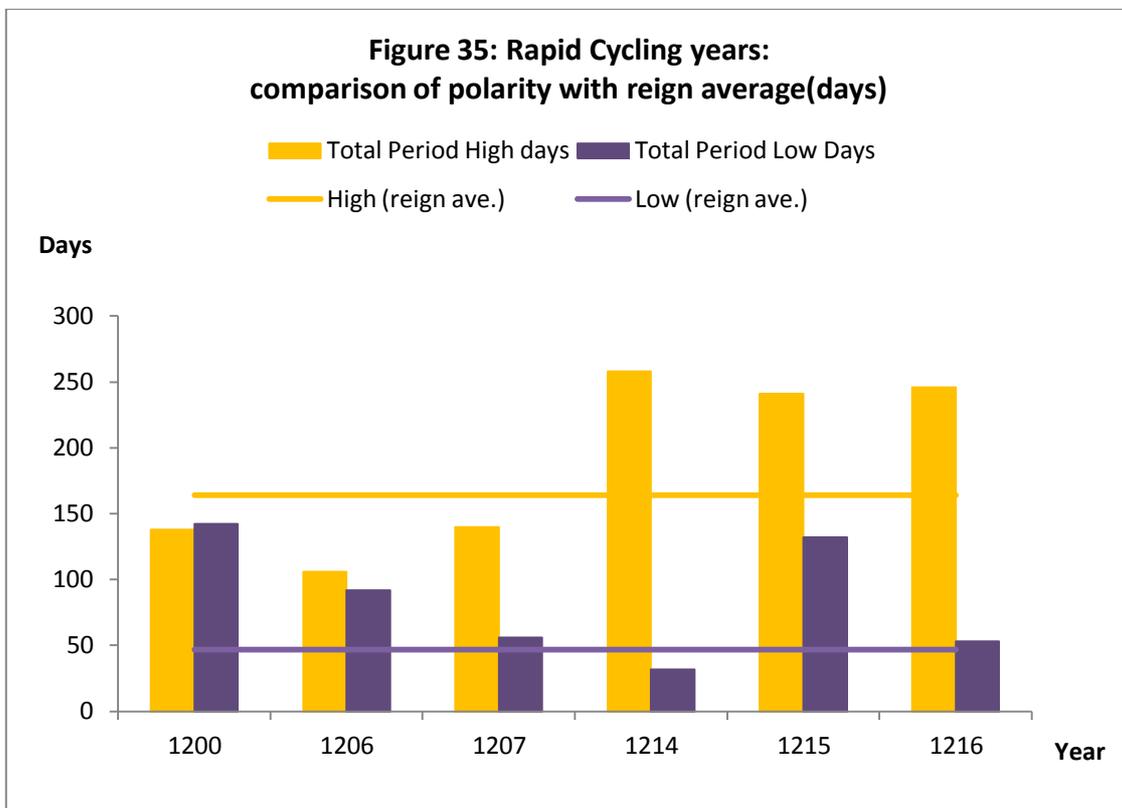
The inter-period durations (time between the end of activity period to start of next activity period) were calculated and the results presented in Figure 34. The very large inter-period durations in 1201, 1208 and 1210 may be a partial reflection of the excluded periods of excessive uncertainty which were maximal around 1202, 1207 and 1211 (See Figure 23, p88)



Histogram of the duration between identified periods (days (y-axis) plotted against date (x-axis) showing variably.

#### 4 Analysis of Rapid Cycling Years

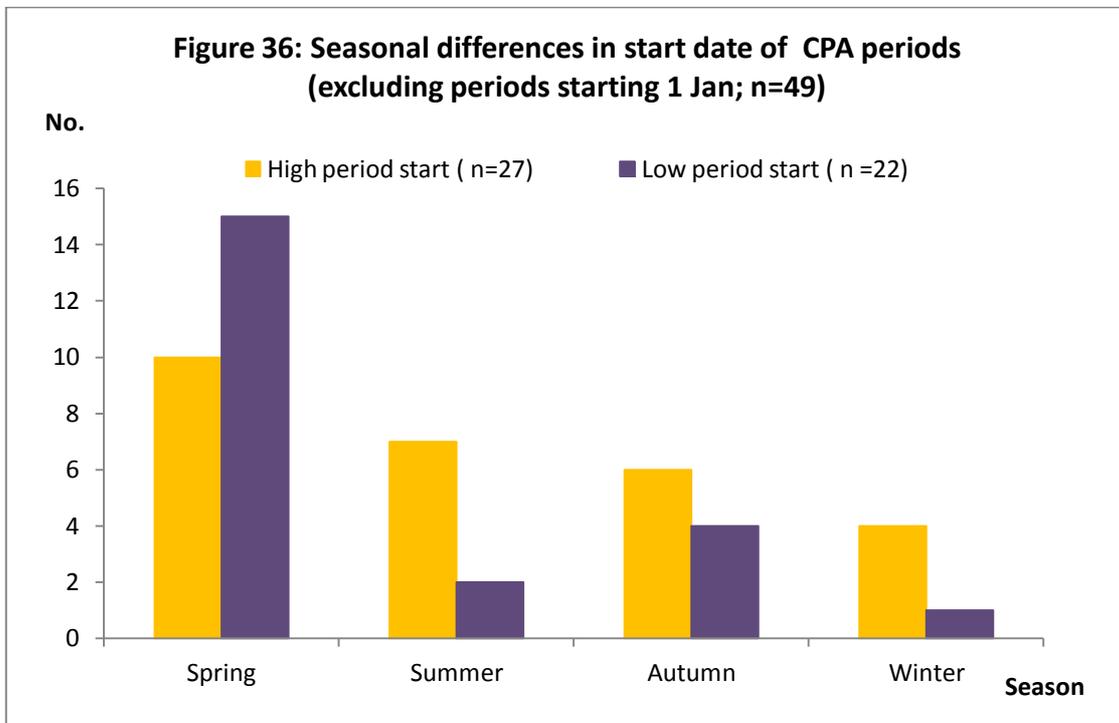
Rapid cycling years ( $\geq 4$  periods/year) hold a special place in the bipolar literature, not least because of Slater's fallacy. (Oepen et al., 2004), (Section 2.3.5 p29) It occurred in 1200, 1206, 1207, 1214, 1215 and 1216. Taking the reign average for the number of high and low days per year, the graph below compares this average against the total number of high period and low period days during each of the six rapid cycling years ( $\geq 4$  episodes/y). The results show 3 years where the total number of high days was in excess of the reign average (1214, 1215 and 1216) and that the total number of low days was in excess of the reign average during all rapid cycling years with the exception of 1214. In addition, there is a decreasing trend in the number of low days from 1200 to 1214. Year 1215 is unique in being entirely composed of identified periods.



*Histogram of total number of high or low days (days) (y-axis) plotted against the six rapid cycling years and in comparison with the reign averages, showing a decreasing trend in the number of low days from 1200 to 1214 and the number of high days in excess of the reign average during 1214-1216. This latter may reflect circumstances surrounding civil unrest in 1215, but this would not explain the high number of low days during the same year.*

### 5. Analysis of Seasonality

Using the start date of each significant, compliant and acceptable period (CPA), their incidence during the astronomical seasons was plotted. (Spring: 21 Mar- 20Jun; Summer: 21 Jun to 20 Sept; Autumn: 21 Sept to 20 Dec; Winter: 21Dec to 20Mar). This showed Spring to have the greatest incidence of both high and low periods; a steady decline in high period incidence as the year progresses, unlike low period incidence, which showed a secondary peak in Autumn. This low period pattern is similar to that described in bipolar depression by Eastwood. (Eastwood and Peter, 1988) Mania is also more common in springtime but mixed episodes predominate in later summer (Cassidy and Carroll, 2002)



*Histogram of the number of high and low periods collated by their start date ( y-axis) and plotted against the astronomical seasons( x-axis) showing a higher incidence of both types of period in Springtime and a secondary peak in low periods during the Autumn.*

### **4.3.3 Are the changes only seen in travelling activity?**

To validate the findings of variation in activity obtained from King John's travelling record, changes in other markers of activity for which there are records were examined, namely:

- 1. Analysis of legal Activity: Feet of Fines**
- 2. Analysis of Alms Giving in lieu of Religious Observance**
- 3. Analysis of Administration**

#### **1. Legal Activity: Feet of Fines**

##### **Background**

The term *Curia Regis*, or King's court signified not only the physical centre of the King's household attended by his advisory council but the highest legal court of the land with the king himself its embodiment: "*Difficult points [of law] were frequently referred to the king, the fount of law...*" (Flower, 1944) p15 Despite this, there are examples when King John deferred judgement in order to take advice from his barons.(Flower, 1944)p16.

The existing record of this court starts in October 1200, when King John began to be in England for substantial periods, but stops in 1215 with the endorsement: *ultimus rotulus placitorum ante guerram*.(Flower, 1944)p20. In the king's absence, justice was dispensed by professional judges, both at Westminster and during their travels or circuits (*eyre*), with their activities recorded on the Rolls of the Bench. However, although

*" [i]t would be reasonable to expect that when he was abroad the scope of the justices at Westminster would be appreciably wider, ... a comparison of the rolls of the bench for Michaelmas 1200 with the corresponding term in 1201 reveals little difference in the activities of the court."*

*"During 1204 and 1205 and the first part of 1206 there are rolls for both courts. From Michaelmas 1204 to Hilary 1207, the bench sat in every term; ... From Michaelmas 1207 until Easter 1209, there are rolls for both courts, but they conceal a dramatic change whereby the king established his personal rule. ... Postponements are the rule; in one case only did the court [of the bench] venture to give a judgement [guilty plea]..."*

(Flower, 1944)pp 33, 19, 20.

The king had ordered "*that pleas should no longer be heard at Westminster*" although judges still followed their circuits but were now based from the royal court.(Flower, 1944)p33. From 1212, "*the entries in the record are grouped locally in accordance with the royal progress.*"(Flower, 1944)p20.

In 1967, DM Stenton published the Feet of Fines (1190-1215) - the court archive of judgements made during this period.(Stenton, 1967) The term *foot* is derived from the practice of making three

copies on one sheet of parchment - two side by side and one at the bottom. The three duplicates were torn apart so that matching the ragged edges gave additional veracity if there was a subsequent dispute. The copy at the bottom (foot of the document) was held in the court archives (1182–1833) (Feetoffines, 2014) The term "fine" denotes that the sentence of the court was a financial penalty. Thus, this analysis seeks to identify variations in legal activity so that they can be compared against changes in travelling.

## **Method**

Stenton lists the activities of individual judges including those of the king. The date of each foot of fine that had been issued by King John was noted and the total number issued on each date tabulated using Microsoft Excel. Descriptive statistics are presented with an analysis of the percentage of high/normal/low days that were associated with legal work.

## **Results**

King John personally issued 494 fines from 1204 to 1215: their monthly frequency is demonstrated below with an annual breakdown.(Figure 37) This demonstrates the evolving pattern of court sitting during the four legal terms that became statutory in 1285 (NewSquareChambers):

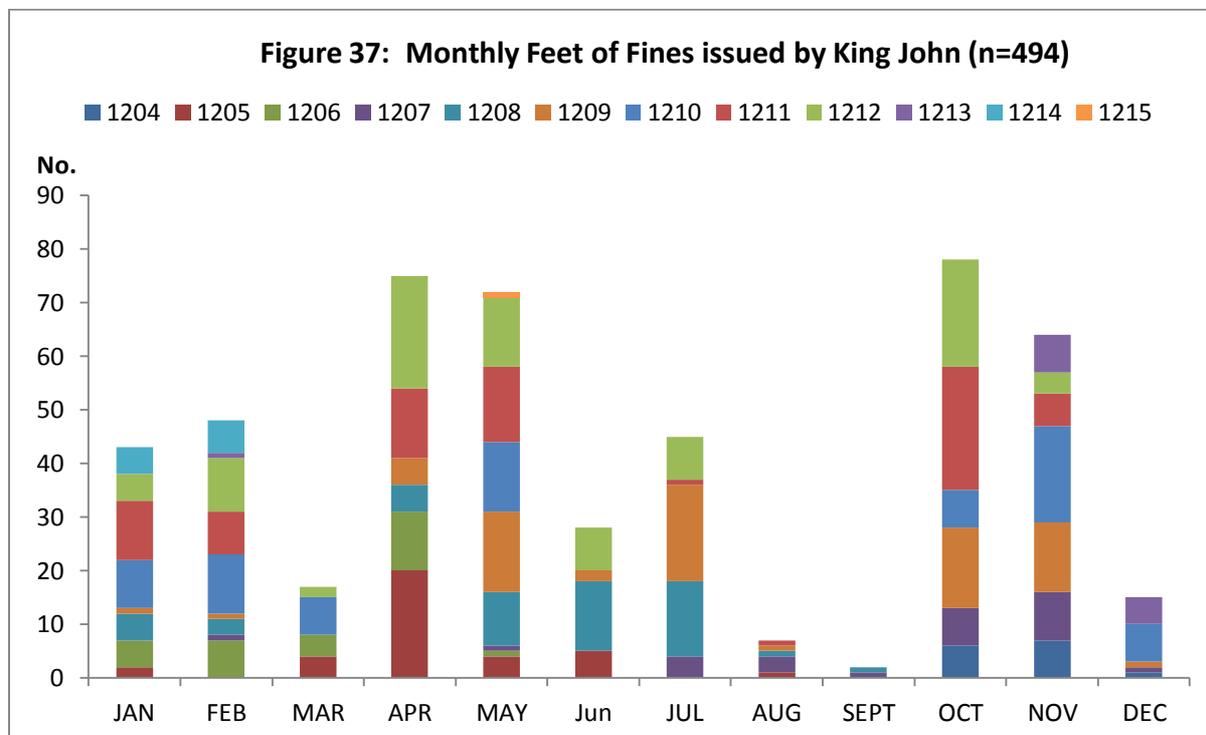
- Hilary (fixed around 13 Jan, the feast day of St Hilary of Poitiers);
- Easter (moveable feast: late March – April)
- Trinity (fixed around Trinity Sunday, 56 days after Easter)
- Michaelmas (based round 29 Sept, the feast of St Michael the Archangel).

### High Legal Activity

The high legal activity of Oct/Nov 1210 was associated with low travelling activity (CPA) although of high uncertainty (50.3%). This relationship might be expected as King John had more time available to devote to legal tasks when not travelling. However, this pattern is not consistent with the high legal activity of April 1205 and Oct 1212 which is associated with fully compliant CPA high travelling periods. This is contrary to expectations as King John had less time to devote to legal work. As a result, it is not possible to infer King John's travelling activity during the missing document period (12 May 1211 - 3 May 1212) which contains two HIGH legal activity periods (Oct/Nov 1211 and April 1212). Finally, although CPA does not identify any changes in travelling activity during July 1209 to match the high legal activity, circumstantial evidence notes King John's military excursion to Norham and the story of its associated mutiny retold by Gervase ((Luard, 1866)p451, (Bower, 1994)p451, (Stubbs, 1880)p102. This association between such unusual circumstances and high legal activity lends weight to the bipolar thesis.

## Low Legal Activity

The anticipated reverse pattern of low legal activity partnered by periods of high journeying activity is found in Jan – Oct 1213. Fluctuations in the king's travelling activity during the rapid cycling period Jan – Sept 1207 may have also made the organisation of any legal activity difficult.



Stacked histogram of number of Feet of Fines issued by King John per month (y-axis) plotted against named month between 1204 and 1215 showing least activity during Mar, Aug, Sept and Dec.

## Statistical Analysis

When the total number of high days, "median days" and low days (by CPA) for Yrs1204–1215 are each tallied, the percentage with legal work by King John for each type are were calculated and shown in Table 12. This indicates that King John's legal activity was more than twice as common during high or median CPA travelling periods, than during low activity periods and confirmed statistically using the Odds Ratio. (Odds Ratio = 2.13 (CI 0.97,4.67@95%))

**Table 12: Comparison of Legal Work with Period Polarity (CPA)**

Comparison :	Number (n=87)	Percentage
High days with legal work/ all high days	71 / 1832	3.8
Median days with legal work / all median days	9 / 216	4.1
Low days with legal work / all low days	7 / 377	1.8

## **2. Alms Giving in lieu of Religious Observance**

### **Background**

The medieval Christian Catholic church claimed authority over the human appetites of its adherents, whether of a sexual nature or for sustenance. Its influence was greatest over the clerical orders where in addition to celibacy, "*wine... was reserved for feast days - of which there were a hundred or so in the year*" and there was "*a meat allowance*". (Danziger and Gillingham, 2003)p206. The laity were also encouraged to "*cleanse themselves through six methods: confession, repentance, vigils, fasting, prayer and alms-giving*".(Bartlett, 2000)p453. King John was not exempt from these strictures and there is evidence from the Praestitia Rolls of money advances to pay for charitable alms that paid for poor relief.(Webster, 2015)p113, 114. Evidence of his additional compliance is also seen in the first donation of royal Maundy money on the eponymous Thursday of Lent, at Knaresborough in 1210 and again at Rochester in 1215.(Kellet, 1990, Webster, 2015)p118.

Alms-giving was inextricably linked to fasting: Webster quotes Archbishop Stephen Langton's view that "*alms without fasting are more valuable than fasting without alms*" and that "*fasting without almsgiving is no good*" and which "*could be seen to justify his [John's] policy of not fasting and giving alms instead*".(Webster, 2015)pp112,113. In support of this, Webster provides a collation from the Misae Rolls of alms-giving in lieu of fasting on either Friday feast days (where a Saints day fell on Friday which was traditionally a weekly fast day), the eve of feast days or the day following feast days which were sometimes also deemed fast days. He also notes that there appears to have been a fixed penalty of 9s 4½d or enough to feed 100 of the needy.(Webster, 2015)pp 115-117. This also provides a benchmark for King John's payment of five times this sum in lieu of breaking his Good Friday fast (3 Apr 1209). Thus, this analysis seeks to identify variations in alms giving so that they can be compared against changes in travelling.

### **Method**

Webster's collation was entered into Microsoft Excel. Against this, the day of the week was obtained from the itinerary and its relationship to the CPA travelling periods.

### **Results**

Evidence of King John paying alms in lieu of fasting was associated with 17 feast days over three non-consecutive years, namely 1209 (n=4), 1212 (n=11) and 1213 (n=2). The non observance of Friday fasting that concurred with a Saints days (feast day) appeared to form the greatest proportion, namely 11 (65%). The remaining days (6) were related to feast days that were equally divided between Saturday (3: all eve of feasts) and Thursday, of which two are linked to Ascension Day (1209 & 1212) which was also his regnal anniversary.

### Analysis

The CPA analysis does not identify any periods of change in 1209 (n=4) and therefore no comparative analysis can be made.

Taking the remaining 13 non-observed fast days during 1212 (n=11) and 1213 (n=2), 12 were found to fall within a high CPA period and 1 within a low one (1212). However, when this is analysed in terms of days, by comparing the number of non-observed feast days against the total number of days identified by CPA for each year for each polarity, the results are more comparable i.e. 4.5% vs. 4.8%. (Table 13) This indicates that there is no apparent influence of high or low periods on King John's non-observance. This was confirmed statistically using Odds Ratio = 1.11 [CI 0.14, 8.68 @95%]

**Table13: Comparison of Alms giving in Lieu with High or Low Activity**

<b>Comparison :</b>	<b>1212</b>	<b>1213</b>
<b>Alms in lieu during high period / all high days during that year (%)</b>	10/220 (4.5%)	2/324 (0.6%)
<b>Alms in lieu during low period / all low days during that year (%)</b>	1/29 (4.8%)	0

### **3. Administration**

The itineraries presented both by TD Hardy and the Magna Carta Project do not provide any specific information on the number of documents issued on any one day.(Hardy 1835a),(Vincent, 2015) Despite this, an indication of variability in administration was obtained from the analysis of those 92 dates that have 3 locations attributed to them since these must be based on at least three documents. These were already been identified by the study when considering the order of locations presented by TD Hardy some of which were amended by the study in order to conserve distance. Thus, this analysis seeks to identify variations in administration so that they can be compared against changes in travelling.

#### **Method**

The Excel information collated for Figure 1 in Appendix4: Data Generation) was expanded to include the MAS of the journey on that day and CPA period value (MAS) if that existed.

#### **Results**

Figure 38 presents a barchart of the 3-location-days and marked where they are concurrent with a high and low CPA periods. Analysis demonstrated that 75 (81.5%) 3-location-days occurred during CPA high periods whereas 5 (5.4%) 3-location-days fell in low activity periods, with 12 (13%) 3-



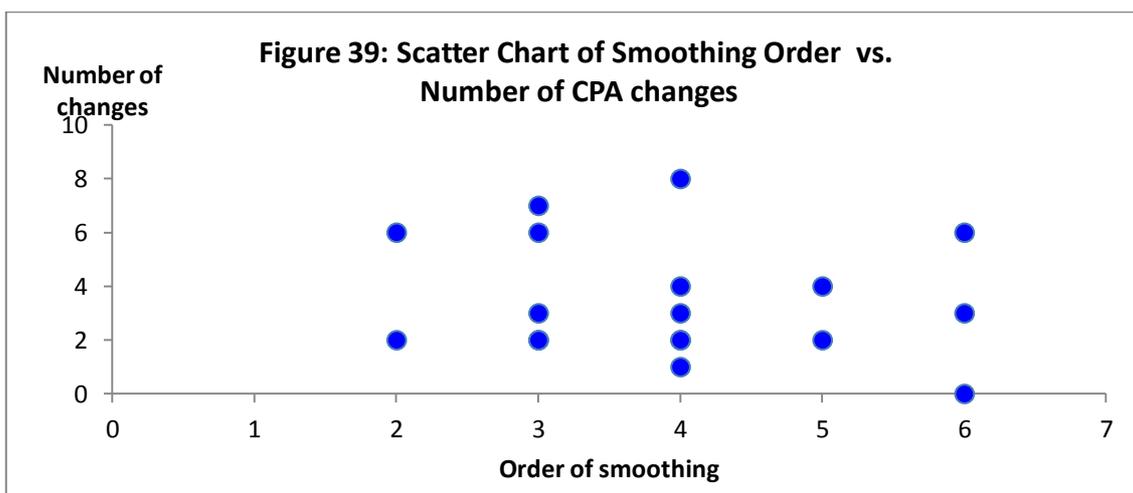
#### 4.3.4 Are the changes identified an anomaly of the CPA program?

This investigation tested the CPA results in two ways. The first investigated evidence of internal influences such as the smoothing order on the CPA changes. The second tested the CPA results externally against another independent methodology.

##### *Internal CPA influences: smoothing order*

Every year of King John's reign complied with the program requirements of the Change Point Analyzer™. The greatest smoothing order was limited to 7 with an average of 4. All years except 1216 required ranking to accommodate outliers. The resultant scatter plot shows no correlation between the smoothing order and the number of changes, and was confirmed by Spearman's Ranked two tailed test ( $R = -0.139 @ p = 0.5$ ). This suggests that the smoothing order does not influence the number of changes identified.

Year	Order	Number of Changes
1199	6	0
1200	5	2
1201	6	3
1202	6	6
1203	4	4
1204	4	2
1205	3	2
1206	5	4
1207	3	7
1208	4	1
1209	3	2
1210	4	2
1211	4	3
1212	2	2
1213	2	6
1214	3	3
1215	4	8
1216	3	6



Scatter chart of the Smoothing Orders required by the Change Point Analyzer for each year of King John's reign plotted against the number of changes in activity found, showing no association.

## ***External comparison: Bollinger Bands™: Method***

### **Background**

This investigation considered volatility: a global concept that encompasses distractibility and impulsivity. Specifically, over the past fifty years, the term has also been used to describe bipolar disorder: Mayer-Gross and colleagues note that "**volatility and irritability are prominent symptoms of the psychosis**" (Mayer-Gross et al., 1969); Goodwin and Jamison speak of "[c]hanges in ...mood (expansiveness or undue enthusiasm, **volatility**, pessimism and hopelessness), ...are all highly characteristic of impending affective episodes." (Goodwin and Jamison, 2007) and Murray and Harvey that "[b]ehavioural data support the popular assumption that sleep disturbance strongly increases negative mood, irritability, and affective **volatility**..." (Murray and Harvey, 2010)

Volatility is also a term that is widely applied to describe price fluctuation in the stock market. However these changes are not intrinsic to the commodity but arise from values ascribed to them by traders based on such variables as previous experience, speculation and market availability. Bollinger Bands™ are a widely used mathematical model that monitors market volatility. The study therefore postulated that since volatility is a human behaviour monitored by Bollinger Bands™ and a behaviour that is recognised in the bipolar literature, it is both reasonable and logical to use Bollinger Bands™ to investigate possible bipolar volatility. This would create as an independent mathematical comparator to Change Point Analysis that differed in both parameter (volatility vs. activity) and in its mathematical methodology. However, to my knowledge, neither this method (BB™), nor this clinical parameter (volatility) has been used previously to investigate bipolar disorder.

The discovery and application of Bollinger Bands™ stems from the first statistical exploration undertaken by this study. My original analytical concept had been to identify periods of sustained high or low activity that "lay outside" two standard deviations as indicative of significant polar episodes. This method was derived from one currently used in public health medicine to trigger the declaration of 'flu epidemics and which also uses the concept of thresholds where those "*exceeding their threshold are then flagged for further investigation*". (Farrington et al., 1996) However King John's activity was found to be non-parametric and did not conform to that model's assumptions for 'flu surveillance. More importantly, basic Time Series analysis showed the data to be highly variable and non-stationary. This raised the concept of volatility and the possible translational application of Bollinger Bands™.

## **Bollinger Bands™**

Bollinger Bands™ are also termed volatility bands and are derived from the concept of trading bands as traders are interested in changes that occur near the edges of the bands. (StockCharts.com, Bollinger) Trading bands were first described by JM Hurst in 1970, who plotted the stock price structure as a time series (time on the x axis; stock price on the y axis) before adding boundaries above and below the graph line to form an "envelope". (Bollinger) The model was developed by using **simple moving averages (SMA)** to smooth out variability e.g. the Dow Jones Industrial Average (DJIA) was analysed using a SMA of 21days, although the band width was chosen arbitrarily, ranging from 3.5 to 4.0% . Marc Chaikin of Bomar Securities addressed this choice by proposing to select them on the basis of "a fixed percentage of the data over the past year", namely using an upper band of 3% and a lower band of 2% so as to encompass 85% of the data between the bands when using a 21 day moving average. These calculations are called Bomar Bands. (Elder, 1993, Bollinger)

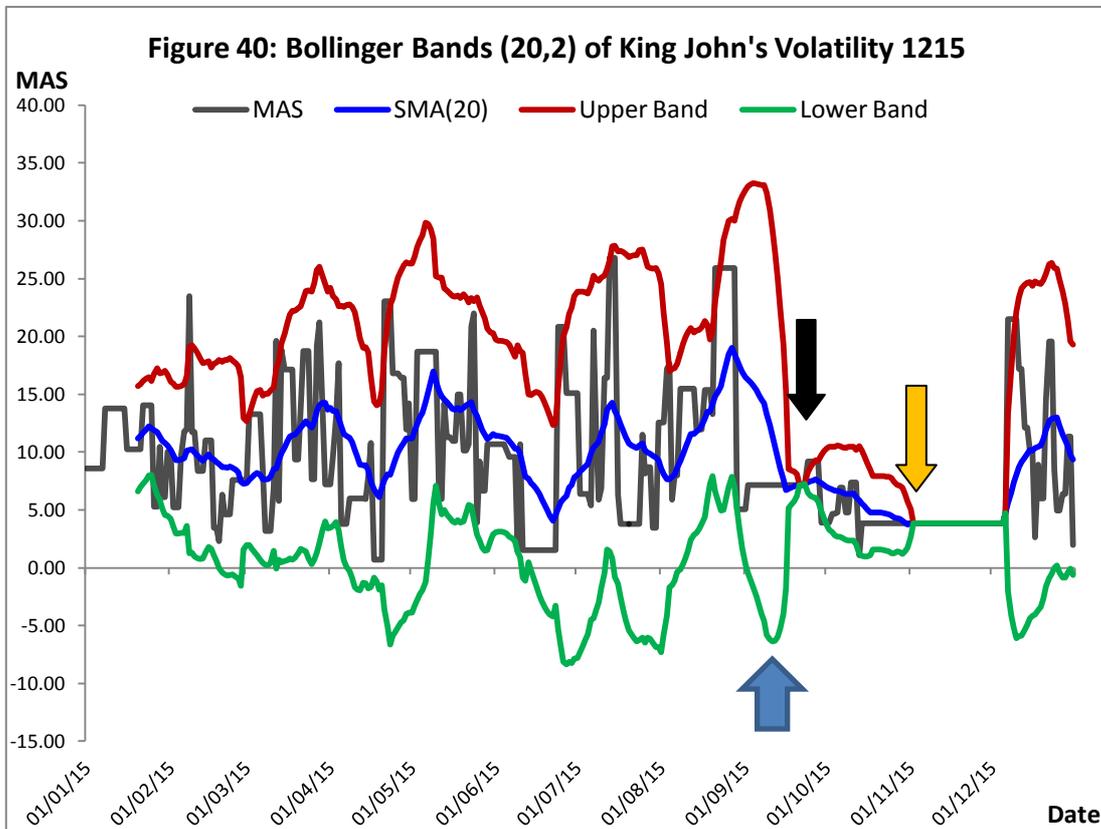
Extending this principle, Bollinger then selected the "standard deviation [SD, Sigma] as the method by which to set band width", as  $2SD$  marks the threshold of a probability of 0.05 ( $p=0.05$ ). He also noted that "the distribution of security prices is non-normal ... (In practice we typically find 90%, not 95% of the data inside the Bollinger Bands with the default parameters)" and that "Bollinger Bands can be used on bars of any length, 5minutes, one hour, daily, weekly etc. The key is that the bars must contain enough activity to give a robust picture...".(Bollinger) However changing the SMA parameter requires comparable adjustments i.e.

*"With a 20-day SMA and 20-day Standard Deviation, the standard deviation multiplier is set at 2. Bollinger suggests increasing the standard deviation multiplier to 2.1 for a 50-period SMA and decreasing the standard deviation multiplier to 1.9 for a 10-period SMA."*

(StockCharts.com)

An illustration is presented in Figure 40 (Year 1215) and analysed using a 20 day simple moving average and  $x2$  standard deviations (20,2). This demonstrates the movement of the Bollinger bands (red and green) around the simple moving average (blue) of King John's activity shown in black (MAS). This contraction or expansion of the Bollinger bands - the arithmetical difference between the upper and lower band for a given time point - is the measure of volatility for that time point. Thus, King John's activity (MAS, black) shows a decline which is mirrored by a fall in SMA and BB (black arrow) and which equates to low activity and low volatility; the pattern is repeated a few weeks later (gold arrow) and demonstrates

contraction in the bands. In contrast, the period indicated by the blue arrow illustrates high volatility (expansion of the bandwidth) despite a fall in activity (black) and SMA (blue) indicating high volatility during low activity.



Graph of King John's activity (Year 1215, black, MAS), their Simple Moving Average (SMA, blue) and Bollinger Bands (BB, red and green) (MAS, y-axes) plotted against time (months) (x-axis) showing the expansion and contraction of the BB around the SMA. BB are calculated using x2 standard deviations; SMA has an order of 20 days (20,2). (Arrows as per text above)

### Methodology

This investigation used the retro imputation model of the Moderated Activity Score (MAS) data of King John's travelling activity, although where sea travel had previously been allocated zero MAS for analysis by Change Point Analysis, it was retro filled irrespective of sea travel for Bollinger Band™ analysis. This was because BB™ cannot handle zero.

The stock price uses simple moving average (SMA) order=20 and x2 standard deviation (SD) which is written as: BB™ 20, 2. This was used as a starting point, and the percentage of results within the bands for each calendar year was calculated to ensure compliance.

## Calculating Volatility

Following examples provided by [www.metastock.com](http://www.metastock.com), [stockchart.com](http://stockchart.com) and [fxtrade.oanada.co.uk](http://fxtrade.oanada.co.uk) (Metastock, StockCharts.com, fxtrade.oanada.co.uk), data was entered into Microsoft Excel™ and calculations performed using its standard functions thus:

1. The date and MAS (retro imputation model) was entered into columns A and B respectively.
2. A simple moving average of chosen order was obtained from Column B and entered in Column C using the Moving Average Function found in the Excel Data Analysis package. The column was filled by click and drag.
3. The simple moving standard deviation of the same order was entered in Column D using the EXCEL function *STDEVPA* (where *STDEV* is Standard Deviation and *PA* relates to Population All indicating that the data is complete rather than a sample). The column was filled by click and drag.
4. The Upper Bollinger Band was calculated and entered in Column E by taking the moving average in Column C and adding x2 standard deviation (Col D). The column was filled by click and drag.
5. The Lower Bollinger Band was likewise calculated by subtracting x2 standard deviation from the moving average and entered in Column F. The column was filled by click and drag.
6. Volatility was calculated by subtracting the value of the Lower Band (Column F) from the Upper Band (Column E) and its column (G) was filled by click and drag.
7. Outliers were identified when the value of MAS (Col B) was greater or lesser than the upper and lower bounds respectively. They were identified using the Excel **IF** function and entered in Column H and I respectively. Each column was filled by click and drag. The percentage count of each outlier group was calculated, this percentage being the reciprocal percentage of the results found within the Bollinger bands e.g. 10% outliers = 90% data within bands.
8. The median Volatility for each calendar year was obtained using Data Analysis, Descriptive Statistics, @95% confidence and entered into Column J.
9. Outliers that were above the median were entered in Column K and identified using the Excel IF function: =IF (G21>J21, 35, 0). An arbitrary figure of 35 was chosen so that data could be graphed as columns behind a linear plot of CPA but this was subsequently adjusted for each graph to ensure best presentation. This is

because BB™ analysis produces a binary result unlike CPA which attributes a value of MAS. Each column was filled by click and drag.

10. Outliers below Median were found by = IF( G21<J21,35,0) and entered in Column L. Each column was filled by click and drag.
11. Changes identified by CPA were cut and paste into Column M
12. The median value of CPA ( 8.45MAS) was entered into Column N

A working example of the 1215 spreadsheet is presented in Table 15 below. The yellow highlighted result (SMA) has been calculated by taking the average of the preceding blue data of MAS from 1 Jan to 20 Jan. (Simple average) Reading across the chart, the standard deviation (SD) for the 20 Jan is derived from the same blue data, with the upper band calculated as twice the SD and added to SMA; the lower band is when the same figure is subtracted from the SMA. Volatility, shown in green is the difference between the bands. Returning to the yellow highlighted value (20 Jan), the calculation for next day (21 Jan) takes the values 2 Jan to 21 Jan and so forth, giving rise to the term simple moving average (SMA) as the calculation "slides down the page".

**Table 15: Example of Volatility Spreadsheet (1 Jan -24 Jan 1215, King John)**

Date	MAS	SMA(20)	SD	Upper Band	Lower Band	Volatility	Upper outliers	Lower outliers	Median Volatility	Above Median Volatility	Below Median Volatility	CPA	CPA Median	
01/01/15	8.5875	#N/A										9.8839	8.45	
02/01/15	8.5875	#N/A										9.8839	8.45	
03/01/15	8.5875	#N/A										9.8839	8.45	
04/01/15	8.5875	#N/A										9.8839	8.45	
05/01/15	8.5875	#N/A										9.8839	8.45	
06/01/15	8.5875	#N/A										9.8839	8.45	
07/01/15	8.5875	#N/A										9.8839	8.45	
08/01/15	13.75	#N/A										9.8839	8.45	
09/01/15	13.75	#N/A										9.8839	8.45	
10/01/15	13.75	#N/A										9.8839	8.45	
11/01/15	13.75	#N/A										9.8839	8.45	
12/01/15	13.75	#N/A										9.8839	8.45	
13/01/15	13.75	#N/A										9.8839	8.45	
14/01/15	13.75	#N/A										9.8839	8.45	
15/01/15	13.75	#N/A										9.8839	8.45	
16/01/15	10.25	#N/A										9.8839	8.45	
17/01/15	10.25	#N/A										9.8839	8.45	
18/01/15	10.25	#N/A										9.8839	8.45	
19/01/15	10.25	#N/A										9.8839	8.45	
20/01/15	10.25	11.15125	2.279921	15.71109	6.591408	9.119683	0	0	0	18.3292	0	25	9.8839	8.45
21/01/15	10.25	11.42438	2.217413	15.8592	6.989549	8.869652	0	0	0	18.3292	0	25	9.8839	8.45
22/01/15	14.05	11.6975	2.22122	16.13994	7.255059	8.884881	0	0	0	18.3292	0	25	9.8839	8.45
23/01/15	14.05	11.97063	2.191238	16.3531	7.588149	8.764953	0	0	0	18.3292	0	25	9.8839	8.45
24/01/15	14.05	12.24375	2.126038	16.49583	7.991675	8.504115	0	0	0	18.3292	0	25	9.8839	8.45

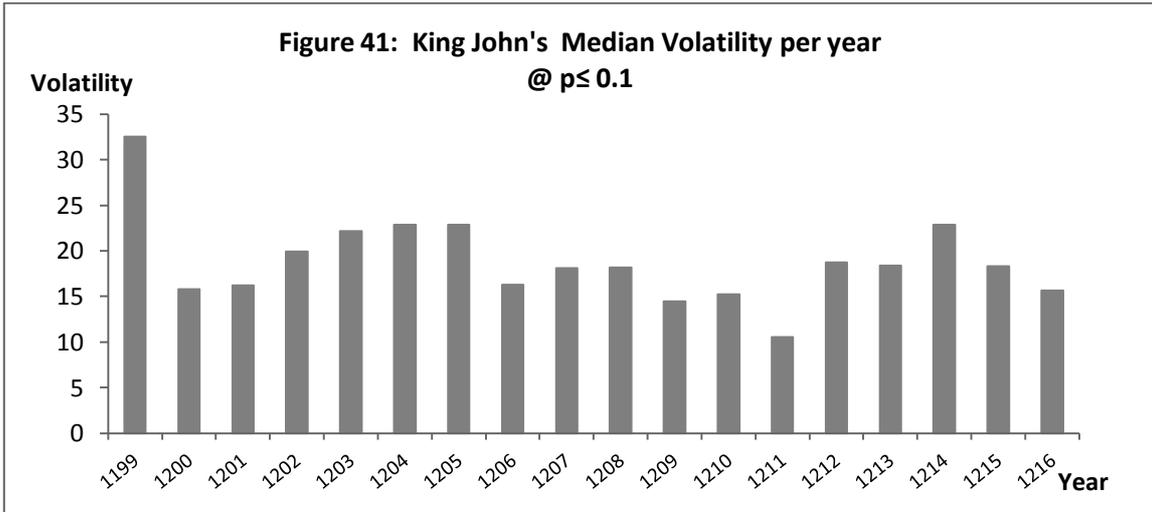
## Results

### BB™ Compliance

Using Bollinger Bands™ 20, 2, King John's data compliance is shown below. ( Table 16) Five calendar years reach  $p \leq 0.05$  compliance (highlighted) but all comply with  $p \leq 0.1$ . Figure 41 shows the median volatility for each year. There is marked volatility in 1199 and a bimodal pattern, maximal in 1204 and 1214 and minimal in 1200 and 1201. As this analysis uses a derivative of distance, this pattern is unlikely to be influenced by the availability of the textual sources.

**Table 16: Compliance of King John's data using Bollinger Bands™ 20, 2**

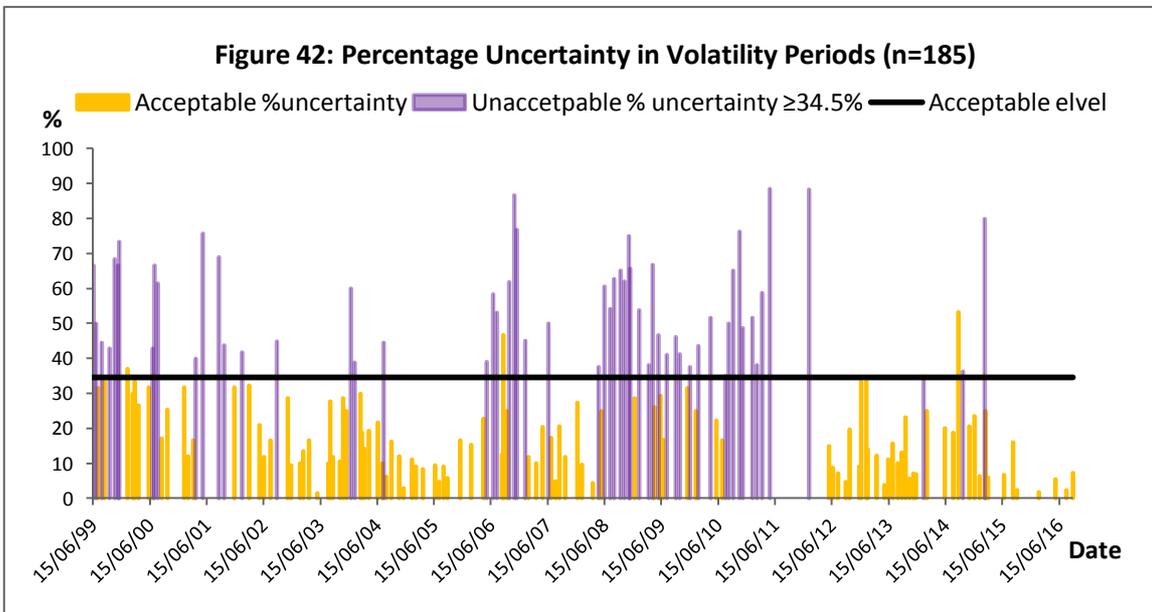
Year	BB™ Distribution Compliance % ( ideal $\geq 95\%$ ; acceptable $>90\%$ )	Volatility Median values/y	Number of Changes Identified
1199	90	32.5	12
1200	91	15.8	14
1201	91	16.3	14
1202	92	19.9	17
1203	91	22.2	16
1204	95	22.9	19
1205	95	22.9	16
1206	92	16.3	17
1207	95	18.1	19
1208	94	18.2	16
1209	95	14.5	17
1210	94	15.3	18
1211	90	10.6	6
1212	96	18.8	21
1213	94	18.4	18
1214	94	22.9	14
1215	93	18.3	20
1216	91	15.6	10
	Overall Compliance % (@ $p=0.05$ ) <ul style="list-style-type: none"> <li>• Mean: 93</li> <li>• Median: 93</li> <li>• SD: 1.9</li> <li>• Range 5.9 (90-96)</li> </ul>	Overall Median (@ $p=0.05$ ) <ul style="list-style-type: none"> <li>• Mean: 19.0</li> <li>• Median :18.3</li> <li>• SD: 4.8</li> <li>• Range: 21.9 (10.5-32.5)</li> </ul>	



Histogram of the median volatility of King John's data (y-axis) plotted against the year (x-axis) showing marked volatility in 1199 and the suggestion of a 10 year oscillation maximal in 1204 and 1214.

### Changes in Volatility

Bollinger Bands™ identified 185 periods of volatility which were either above or below the median for that year. All complied with the ICD-10 diagnostic guidelines of ≥4 days high period or ≥14 days low period. Sixty one periods had excessive internal uncertainty (≥ 34.5%) and were excluded, leaving 124 acceptable periods. (Figure 42 & Tables 17 and 18)



Histogram of percentage uncertainty within each Volatility period (y-axis) plotted against date (x-axis) showing the 61 periods (purple) with excessive intra-period uncertainty (≥34.5%)

**Table: 17: Excluded periods of Volatility**

Volatility date from	Volatility date to	High Duration	Low Duration	%uncertainty
15/06/99	29/06/99	15		66.7
30/06/99	15/07/99		16	50.0
08/08/99	25/08/99	18		44.4
25/09/99	29/10/99	35		42.9
30/10/99	17/11/99		19	68.4
18/11/99	26/11/99	9		66.7
27/11/99	26/12/99		30	73.3
20/01/00	23/02/00		35	37.1
28/06/00	11/07/00		14	42.9
12/07/00	01/08/00	21		66.7
02/08/00	27/08/00		26	61.5
05/04/01	19/05/01	45		40.0
20/05/01	30/08/01		103	75.7
31/08/01	28/09/01	29		69.0
04/10/01	06/12/01	64		43.8
28/01/02	11/03/02	43		41.9
08/09/02	04/11/02		58	44.8
27/12/03	31/12/03	5		60.0
20/01/04	24/02/04		36	38.9
26/07/04	03/08/04	9		44.4
18/05/06	27/06/06		41	39.0
28/06/06	21/07/06	24		58.3
22/07/06	22/08/06		32	53.1
01/09/06	15/09/06	15		46.7
08/10/06	10/11/06		34	61.8
11/11/06	25/11/06	15		86.7
26/11/06	21/12/06		26	76.9
20/01/07	08/02/07	20		45.0
18/06/07	05/07/07		18	50.0
04/05/08	19/05/08	16		37.5
10/06/08	17/07/08		38	60.5
18/07/08	10/08/08	24		54.2
11/08/08	22/09/08		43	62.8
23/09/08	15/10/08	23		65.2
16/10/08	13/11/08		29	62.1
14/11/08	21/11/08	8		75.0
23/11/08	24/12/08		32	65.6
20/01/09	25/03/09		65	53.8
26/03/09	15/04/09	21		38.1
16/04/09	30/04/09		15	66.7
24/05/09	07/06/09		15	46.7
19/07/09	12/09/09	56		41.1
13/09/09	08/10/09		26	46.2
09/10/09	11/11/09	34		41.2
16/12/09	31/12/09		16	37.5
04/02/10	22/04/10	78		43.6
25/04/10	23/05/10	29		51.7
30/07/10	18/08/10		20	35.0
19/08/10	15/09/10	28		50.0
16/09/10	28/10/10		43	65.1
29/10/10	18/11/10	21		76.2
19/11/10	31/12/10		43	48.8
20/01/11	17/02/11		29	51.7
18/02/11	10/03/11	21		38.1
24/03/11	08/05/11	46		58.7
09/05/11	03/06/11		26	88.5
20/01/12	10/05/12		112	88.4
23/01/14	14/02/14	23		34.8
04/09/14	03/10/14		30	53.3

Of the 124 acceptable periods, 88 were periods of high volatility and 36 of low; they encompassed 3,410 days (53.6% reign) with an incidence of 2,031 high volatility days (71% reign) and 1,378 low volatility days (29% reign). Swings and unipolar changes were not demonstrable using floating graphs because of the binary nature of this methodology i.e. its inability to measure the scale of change.

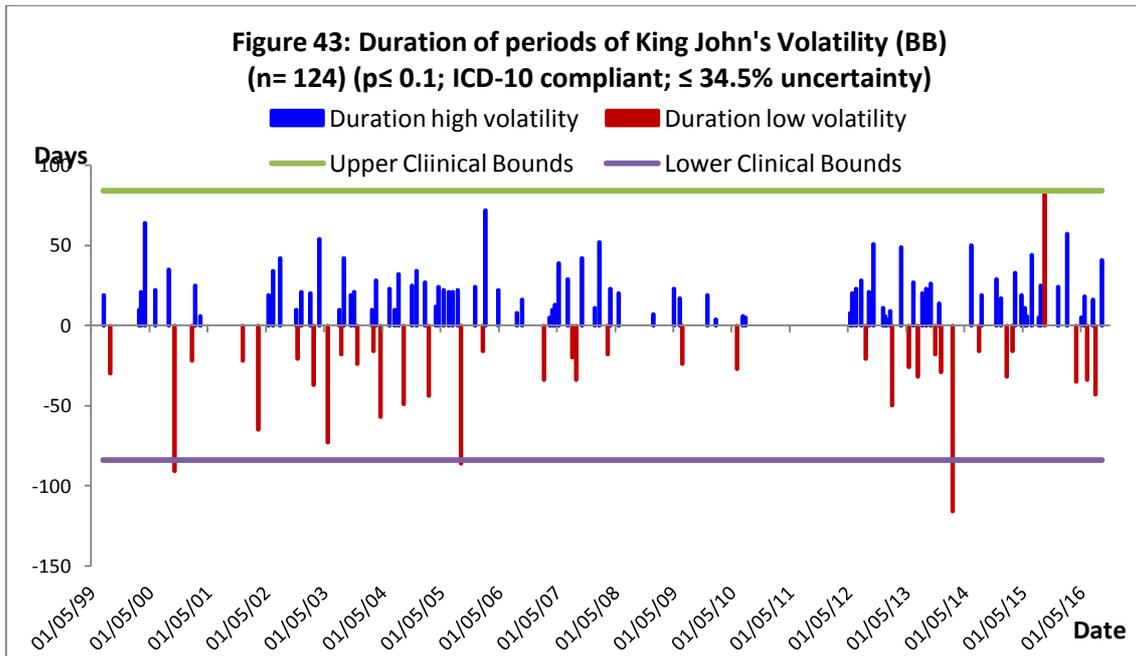
**Table 18: Volatility Periods (n=124)**

Volatility Period Number	Volatility ICD-10 compliant with acceptable uncertainty: START	Volatility END	Duration	Duration high volatility	Duration Low volatility	% Uncertainty	Volatility Period Number	Volatility ICD-10 compliant with acceptable uncertainty: START	Volatility END	Duration	Duration high volatility	Duration Low volatility	% Uncertainty
1	16/07/99	03/08/99	19	19		31.6	63	02/10/07	12/11/07	42	42		11.9
2	26/08/99	24/09/99	30		30	33.3	64	21/12/07	31/12/07	11	11		27.3
3	24/02/00	04/03/00	10	10		30.0	65	20/01/08	11/03/08	52	52		9.6
4	08/03/00	28/03/00	21	21		33.3	66	12/03/08	29/03/08	18		18	0.0
5	31/03/00	02/06/00	64	64		26.6	67	30/03/08	21/04/08	23	23		4.3
6	06/06/00	27/06/00	22	22		31.8	68	21/05/08	09/06/08	20	20		25.0
7	28/08/00	01/10/00	35	35		17.1	69	25/12/08	31/12/08	7	7		28.6
8	02/10/00	31/12/00	91		91	25.3	70	01/05/09	23/05/09	23	23		26.1
9	20/01/01	10/02/01	22		22	31.8	71	08/06/09	24/06/09	17	17		29.4
10	11/02/01	07/03/01	25	25		12.0	72	25/06/09	18/07/09	24		24	16.7
11	16/03/01	21/03/01	6	6		16.7	73	27/11/09	15/12/09	19	19		31.6
12	07/12/01	28/12/01	22		22	31.8	74	20/01/10	23/01/10	4	4		25.0
13	12/03/02	15/05/02	65		65	32.3	75	03/06/10	29/06/10	27		27	22.2
14	16/05/02	03/06/02	19	19		21.1	76	08/07/10	13/07/10	6	6		16.7
15	14/06/02	17/07/02	34	34		11.8	77	25/07/10	29/07/10	5	5		0.0
16	28/07/02	07/09/02	42	42		16.7	78	11/05/12	18/05/12	8	8		0.0
17	05/11/02	14/11/02	10	10		0.0	79	26/05/12	14/06/12	20	20		15.0
18	15/11/02	05/12/02	21		21	28.6	80	19/06/12	11/07/12	23	23		8.7
19	06/12/02	26/12/02	21	21		9.5	81	21/07/12	17/08/12	28	28		7.1
20	02/02/03	21/02/03	20	20		10.0	82	18/08/12	07/09/12	21		21	0.0
21	22/02/03	30/03/03	37		37	13.5	83	08/09/12	28/09/12	21	21		4.8
22	31/03/03	23/05/03	54	54		16.7	84	06/10/12	25/11/12	51	51		19.6
23	24/05/03	04/08/03	73		73	1.4	85	05/12/12	15/12/12	11	11		9.1
24	05/08/03	14/08/03	10	10		10.0	86	17/12/12	22/12/12	6	6		33.3
25	15/08/03	01/09/03	18		18	27.8	87	26/12/12	29/12/12	4	4		0.0
26	02/09/03	13/10/03	42	42		11.9	88	20/01/13	28/01/13	9	9		33.3
27	16/10/03	03/11/03	19	19		10.5	89	29/01/13	19/03/13	50		50	14.0
28	05/11/03	25/11/03	21	21		28.6	90	29/03/13	16/05/13	49	49		12.2
29	26/11/03	19/12/03	24		24	25.0	91	17/05/13	11/06/13	26		26	3.8
30	25/02/04	05/03/04	10	10		30.0	92	12/06/13	08/07/13	27	27		11.1
31	06/03/04	21/03/04	16		16	18.8	93	09/07/13	09/08/13	32		32	15.6
32	22/03/04	18/04/04	28	28		14.3	94	10/08/13	29/08/13	20	20		10.0
33	19/04/04	14/06/04	57		57	19.3	95	03/09/13	25/09/13	23	23		13.0
34	15/06/04	07/07/04	23	23		21.7	96	30/09/13	25/10/13	26	26		23.1
35	14/07/04	23/07/04	10	10		10.0	97	26/10/13	12/11/13	18		18	5.6
36	09/08/04	09/09/04	32	32		6.3	98	19/11/13	02/12/13	14	14		7.1
37	10/09/04	28/10/04	49		49	16.3	99	03/12/13	31/12/13	29		29	6.9
38	02/11/04	26/11/04	25	25		12.0	100	15/02/14	10/06/14	116		116	25.0
39	28/11/04	31/12/04	34	34		2.9	101	11/06/14	30/07/14	50	50		20.0
40	20/01/05	15/02/05	27	27		11.1	102	31/07/14	15/08/14	16		16	18.8
41	16/02/05	31/03/05	44		44	9.1	103	16/08/14	03/09/14	19	19		0.0
42	01/04/05	12/04/05	12	12		8.3	104	15/11/14	13/12/14	29	29		20.7
43	15/04/05	08/05/05	24	24		0.0	105	15/12/14	31/12/14	17	17		23.5
44	19/05/05	09/06/05	22	22		0.0	106	20/01/15	20/02/15	32		32	6.3
45	20/06/05	10/07/05	21	21		9.5	107	26/02/15	13/03/15	16		16	25.0
46	14/07/05	03/08/05	21	21		4.8	108	14/03/15	15/04/15	33	33		6.1
47	14/08/05	04/09/05	22	22		9.1	109	21/04/15	09/05/15	19	19		0.0
48	05/09/05	29/11/05	86		86	5.8	110	11/05/15	21/05/15	11	11		0.0
49	30/11/05	23/12/05	24	24		16.7	111	24/05/15	29/05/15	6	6		0.0
50	20/01/06	04/02/06	16		16	0.0	112	24/06/15	06/08/15	44	44		6.8
51	05/02/06	17/04/06	72	72		15.3	113	08/08/15	12/08/15	5	5		0.0
52	26/04/06	17/05/06	22	22		22.7	114	22/08/15	15/09/15	25	25		16.0
53	23/08/06	30/08/06	8	8		12.5	115	16/09/15	07/12/15	83		83	2.4
54	22/09/06	07/10/06	16	16		25.0	116	08/12/15	31/12/15	24	24		0.0
55	09/02/07	14/03/07	34		34	11.8	117	01/02/16	28/03/16	57	57		1.8
56	15/03/07	19/03/07	5	5		0.0	118	29/03/16	02/05/16	35		35	0.0
57	31/03/07	09/04/07	10	10		10.0	119	03/05/16	07/05/16	5	5		0.0
58	16/04/07	28/04/07	13	13		0.0	120	21/05/16	07/06/16	18	18		5.6
59	10/05/07	17/06/07	39	39		20.5	121	08/06/16	11/07/16	34		34	0.0
60	06/07/07	03/08/07	29	29		17.2	122	12/07/16	27/07/16	16	16		0.0
61	04/08/07	23/08/07	20		20	5.0	123	28/07/16	08/09/16	43		43	2.3
62	29/08/07	01/10/07	34		34	20.6	124	09/09/16	19/10/16	41	41		7.3

## Testing Volatility

### Duration of Volatility

The duration of periods with acceptable and compliant periods of volatility (n=124) are shown in Figure 45. There were no consecutive periods i.e. no clinical periods. Three episodes of volatility exceeded the clinical bounds (Eaton et al), all of which were low volatility periods. (20Oct to 31 Dec 1200; 5 Sept to 29 Nov 1205 and 5 Feb to 10 June 1214)



*Histogram of the duration (days) of all clinically compliant periods AND of acceptable uncertainty of King John's volatility rendered positive if greater than median (blue) or negative if less than median activity (red) and plotted against the date (y-axis) showing the pattern of occurrence and that some periods were in excess of 12wk clinical bounds for rapid cycling bipolar disorder.*

### Statistical Analysis of Duration of Volatility

Neither the duration of high or low volatility had a parametric distribution (Kolmogorov-Smirnov : 0.000 @p=0.05).

**Table 19: Statistics of Duration of High and Low Volatility**

	<b>High Volatility period duration</b>	<b>Low Volatility period duration</b>
<b>Mean</b>	23.0	38.2
<b>Standard Error</b>	1.5	4.1
<b>Median</b>	21.0	31.0
<b>Mode</b>	10.0	16.0
<b>Standard Deviation</b>	14.4	24.7
<b>Sample Variance</b>	209.8	610.6
<b>Kurtosis</b>	0.2	1.9
<b>Skewness</b>	1.1	0.3
<b>Range</b>	68.0	100.0
<b>Minimum</b>	4.0	16.0
<b>Maximum</b>	72.0	116.0
<b>Sum</b>	2031	1378
<b>Count</b>	88	36

The distributions of high versus low duration of volatility was not analysed separately but included in the Kruskal Wallis test when comparing the durations of high and low volatility with high and low activity. This showed no statistical difference in distributions between all four parameters (Kruskal Wallis 0.392 @p=0.05)

## Applying Volatility: the Relationship between Activity and Volatility

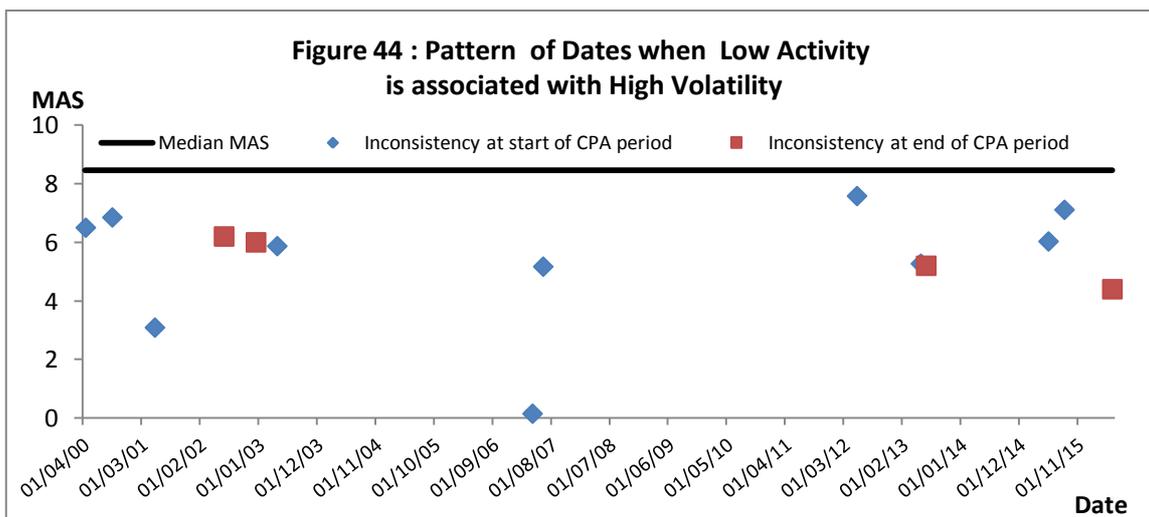
The study has made reference to the literature that associates agitation in depression with an increased risk of suicide. (Day, 1999), (Akiskal et al., 2005), (see Section 2.3.4) This investigation postulated that high volatility during low activity may be a marker of agitation in depression. It therefore identified when high volatility was present at the start and end of low CPA activity periods because these may be periods of parasuicide behaviour.

### Results

Of the 22 possible low CPA periods, 18 had a start date that was within a 7 day window of the start of a volatility period. Of these 18 CPA periods, 8 had similarly low volatility but 10 exhibited high volatility. These ten periods spanned King John's reign accounted for 45% of all low CPA periods but appeared to cluster between 1200-1203 and 1212-1216. (Figure 44) In addition, there were four low CPA periods where the volatility became high before the low activity ceased. (Table 20) The significance of these results is discussed in Section 5.3.3. Further investigations of the relationship between activity and volatility are found in Appendix 7.

**Table 20:**  
**High Volatility with Low Activity**

CPA Start Date	CPA End Date
15/04/00 [Low1]	4/6/02 [Low4]
17/09/00 [Low2]	31/12/02 [Low5]
07/05/01 [Low3]	12/6/13 [Low14]
27/04/03 [Low6]	21/5/16 [Low21]
16/04/07 [Low10]	
03/06/07 [Low11]	
06/05/12 [Low13]	
15/05/13 [Low14]	
25/05/15 [Low17]	
29/08/15 [Low18]	



Graph of moderated activity score (MAS, y-axis) plotted against date (x-axis) showing when low activity was associated with high volatility at either the start or end of the CPA period. There appears to be clustering between 1200-1203 and 1212-1216.

#### **4.3.5 Is this just King John or is it seen in other itineraries?**

As bipolar disorder has a genetic or familial association, the study considered both familial (brother, Richard) and non-familial (contemporary, Peter des Roches) as male comparators.

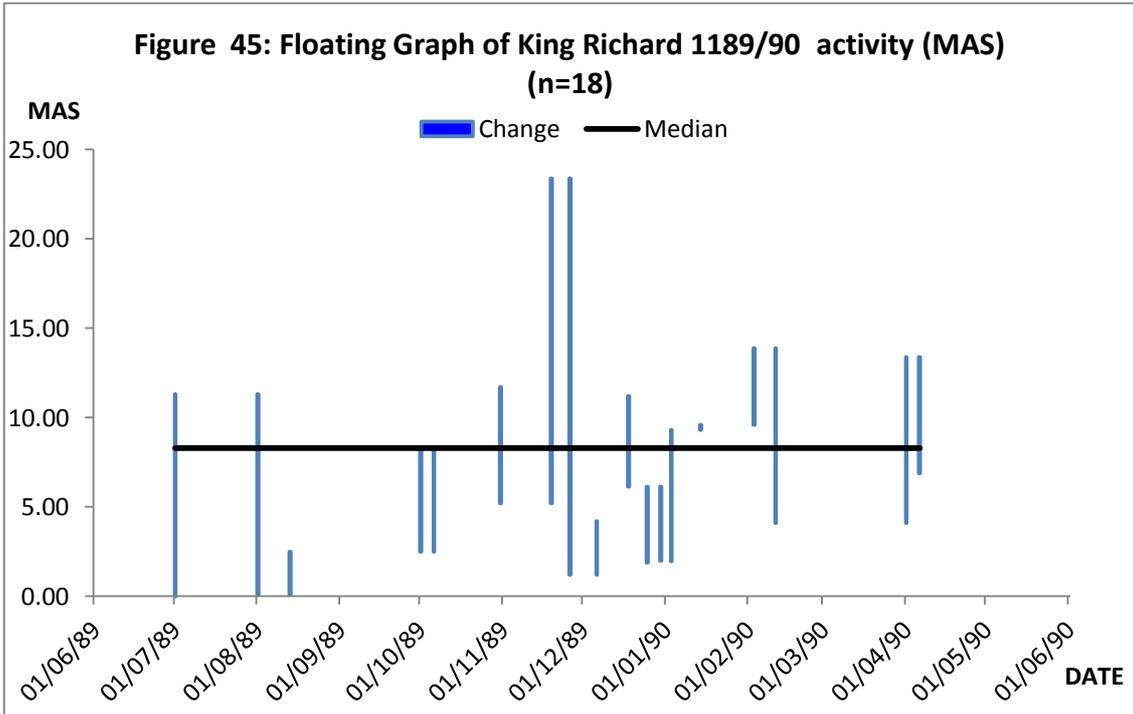
##### ***King Richard: familial comparator***

King Richard (1157 - 1199) spent a significant period of his reign outside the geographical area of this study, leaving two periods – 1189 to 1190 and 1194 to 1199 – suitable for comparison with King John's travels. Data from these two periods are also more typical of the medieval historical era in that they record dates and locations on 18.6% (74 journeys/397 days) and 8% (144 journeys /1863 days) respectively, compared to King John's: 37% (2,367 journeys/ 6,356 days).

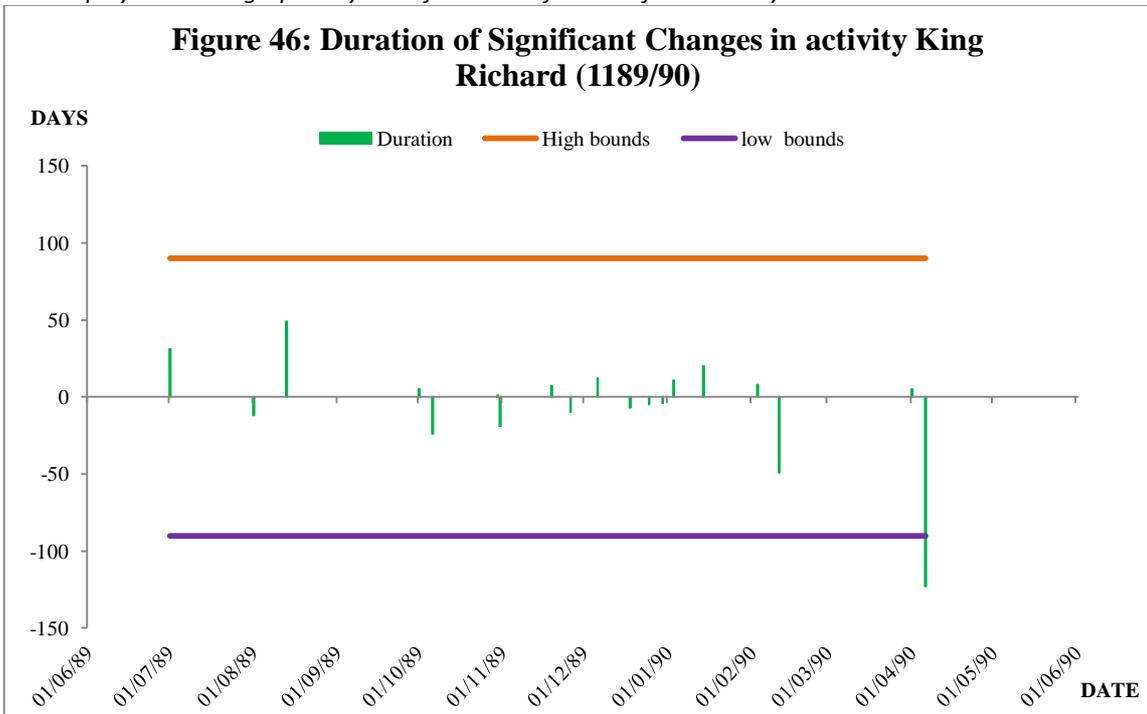
As expected this produced high uncertainty, the influence of which was found to be significant. Although CPA identified significant changes in King Richard's travelling, when all the data of 1189-90 was analysed, no changes were found in the platinum and gold data which held the lowest uncertainty. This implied that the CPA changes arose as a result of the uncertainty and Figures 45 and 46 (over) must be viewed therefore with some reservation. (Median: 8.28MAS) There was insufficient data from 1194-99 to support analysis because of its even greater uncertainty.

##### ***Statistical Analysis***

Comparative statistical analysis of the journeys of King Richard: (1189-90) against those of King John (1199 –1216) however, showed no statistically significant difference in distribution or range between the brothers. (Mann Whitney U: 0.525; Moses: 0.469 @ p =0.05)



Floating Graph of moderated activity score (MAS, y-axis) plotted against date (x-axis) showing scale, polarity and sequence of significant changes in activity (MAS) by King Richard, plotted around the median (8.28MAS). However as no changes were found in the platinum or gold data, the results of all data displayed on this graph may arise from the influence of uncertainty.



Histogram of the duration (days) of identified periods of King Richard's activity, rendered positive if greater than median or negative if less than median activity and plotted against the date (y-axis) showing the pattern of occurrence and that some periods were in excess of 12wk clinical bounds for rapid cycling bipolar disorder.

### ***Peter des Roches: non-familial comparator***

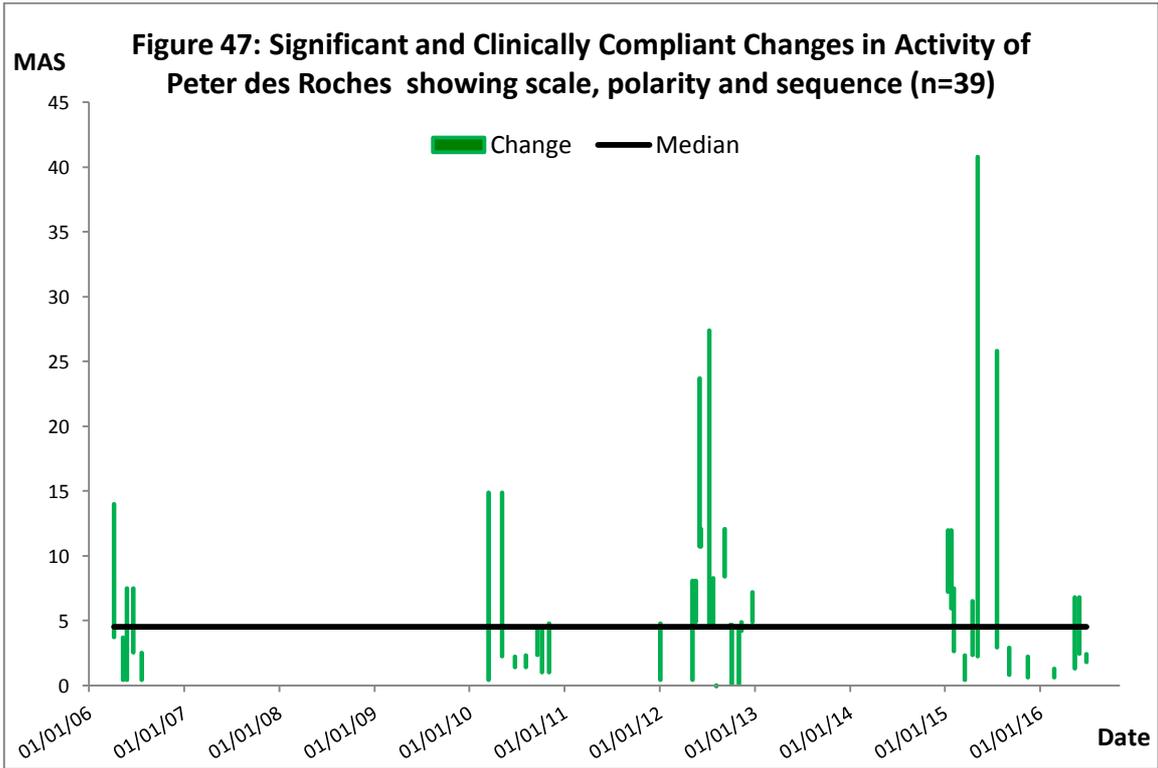
Peter des Roches was a supporter and courtier of King John whose itinerary (20 March 1206 to beyond 19 Oct 1216) records 366 journeys over 3,866 days (9.4%) with a median of 4.5 MAS.

CPA identified significant changes in Peter des Roches' journeys (MAS) during 1206, 1210, 1212, 1215 and 1216. However, the years 1207, 1208, 1209, 1213 and 1214 violated the CPA assumption of independent errors and 1211 had outliers that were not amenable to ranking. This meant that it was not possible to analyse these years using CPA. From the identified changes of 1206, 1210, 1212, 1215 and 1216, 49 significant periods were described of which 6 high periods and 4 low periods were excluded because they did not comply with ICD-10 criteria ( $\geq 4$  days high period;  $\geq 14$  days low period) leaving 39 compliant periods (see Figures 47 and 48).

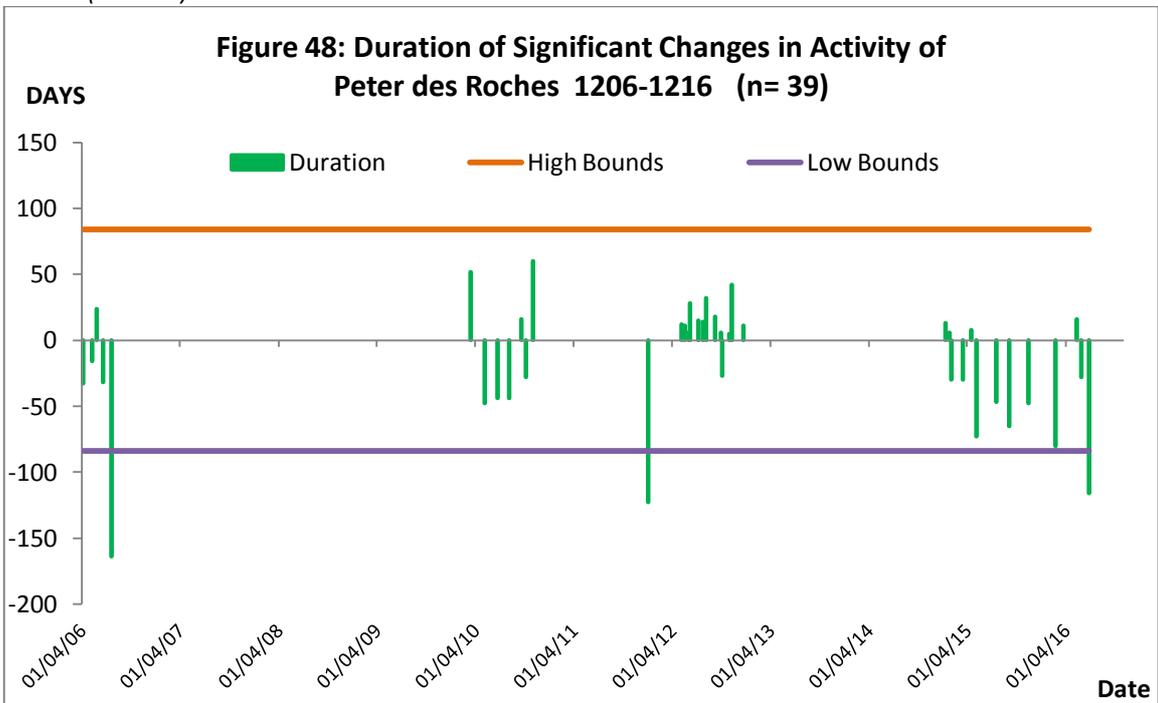
However, 249 journeys (68%) of Peter des Roches' itinerary match exactly that of King John's and a further 15 journeys (4%) match within  $\pm 24$ h. The remaining independent journeys (n=102) have an uncertainty of 97%. An example of this concurrence is shown in Figures 49 and 50 for the year 1215. On inspection these appears to suggest that Peter des Roches travelled more when in the company of the King but this may be because the record of his personal travelling is incomplete.

### ***Statistical Analysis***

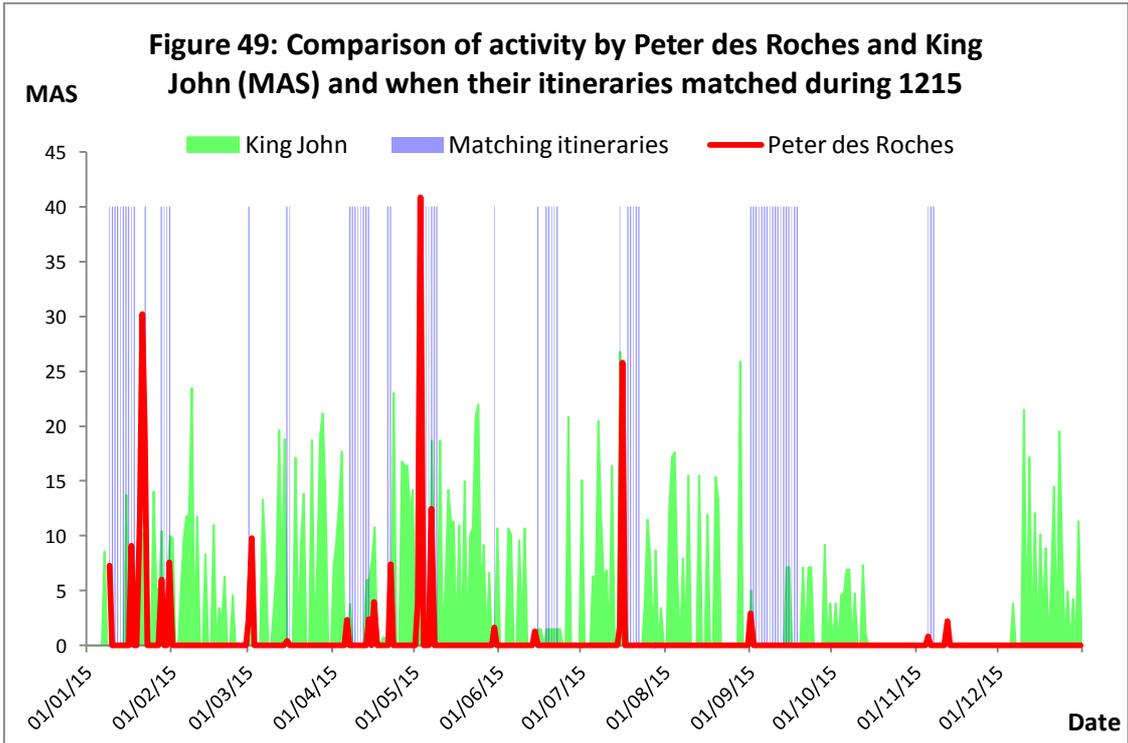
Comparative statistical analysis of the journeys of Peter des Roches against those of King John however, showed a significant difference between the two, both in distribution and in range. (Mann-Whitney U: 0.000; Moses 0.000@  $p=0.05$ ) This is despite the level of their concurrence. This means that that despite their concurrences, the non-familial itinerary of Peter des Roches is statistically different from King John's, in contradistinction to the similarity found between the brothers. These findings however, are confounded by small numbers and high uncertainty.



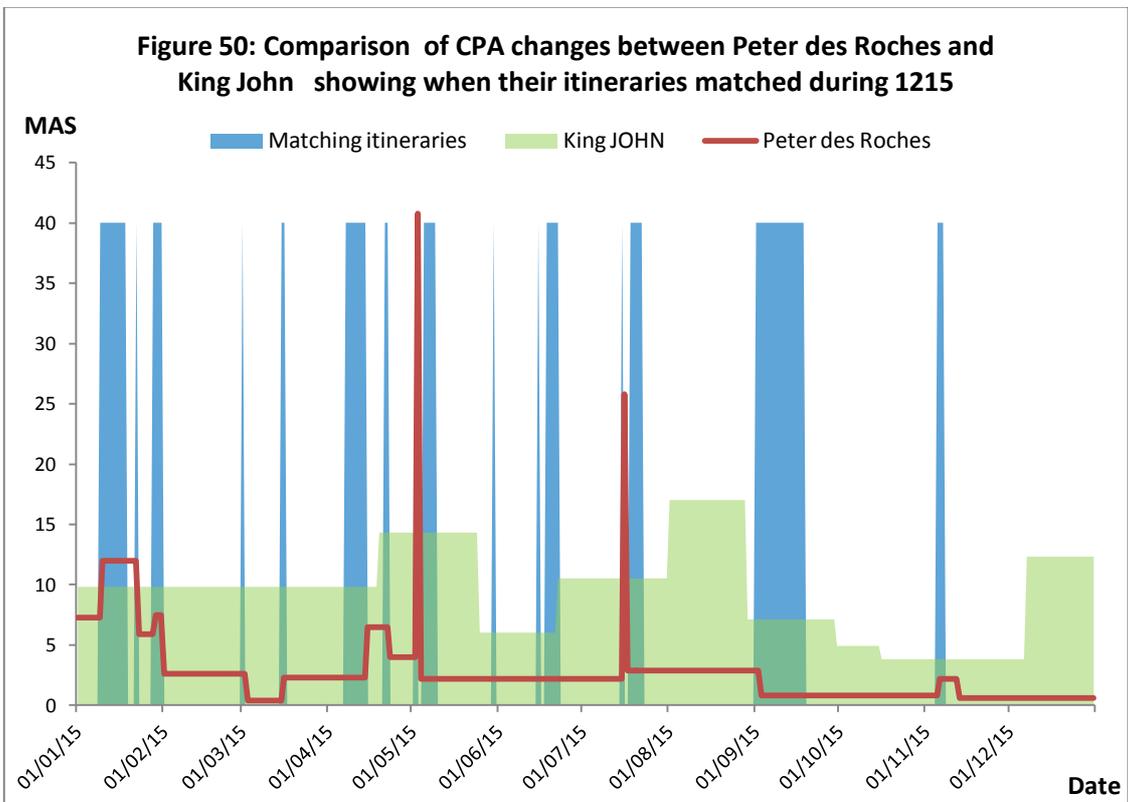
Floating Graph of moderated activity score (MAS, y-axis) plotted against date (x-axis) showing scale, polarity and sequence of significant changes in activity (MAS) by Peter des Roches, plotted around the median (4.5MAS).



Histogram of the duration (days) of identified periods of Peter des Roches' activity, rendered positive if greater than median or negative if less than median activity and plotted against the date (y-axis) showing the pattern of occurrence and that some periods were in excess of 12wk clinical bounds for rapid cycling bipolar disorder.



Graph of moderated activity score ( MAS, y-axis) plotted against date ( x-axis) comparing King John's activity (green) and Peter des Roches' activity (red) , and when the itineraries matched (blue)



Graph of moderated activity score ( MAS, y-axis) plotted against date ( x-axis) comparing King John's CPA changes (green) and Peter des Roches' CPA changes (red), and when the itineraries matched (blue).

#### **4.4 Chapter 4: Summary**

Change Point analysis (CPA) identified 82 statistically significant changes in King John's travelling activity which constituted 83 periods. Of these, 37 high activity and 22 low activity periods were identified that were compliant with ICD-10 criteria and had acceptable levels of uncertainty. These demonstrated patterns of recurrence in both daily changes and life time natural history that were similar in appearance to those published previously for bipolar patients. (Post et al., 1988, Roy-Byrne et al., 1985). Five questions were posed to test the methodology :

**1. Are the identified changes a reflection of the sources or missing data?**

The CPA changes were found to be mathematically independent of the historical sources. The effect of the no record days on the study analysis was small and not likely to be statistically significant.

**2. Do the changes look like bipolar periods?**

These analyses presented some evidence that showed that the period characteristics were consistent with bipolar disorder. Other evidence was inconclusive but did not exclude the condition e.g. the analysis of the identified and clinical periods was inconclusive because of a number of periods of prolonged duration, in addition to those more typical of bipolar disorder. This arose in part because of the confounding influence of circumstances on changes in activity(see Chapter 6). Equally, it may be in part because CPA might be more sensitive to changes in activity than methods published in the bipolar literature.

Analysis of the intra-period duration of the high CPA periods showed they were consistent; the duration of the low periods changed sometime between 1 Jan 1206 and 6 April 1207. The high period findings agree with Goodwin and Jamison who say that "*average episode duration remains stable throughout the illness.*"(Goodwin and Jamison, 2007) The low period findings are inconclusive because of the one significant change in duration. Neither result excludes bipolar disorder. In contrast, the inter-period duration or well period is known to be variable and such was the case in this time series generated for King John.

Rapid cycling years are peculiar to bipolar disorder. Yr1200 predates the loss of Normandy in 1204; Yrs 1206 and 1214 coincide with King John's first and second continental campaigns, and Yr 1215 was the pivotal year of crisis centred around *Magna Carta* (15 June 1215). Travelling with an army for 6 months during 1206 may therefore readily explain the low days but less so the number of high activity days. Equally surprising, are so many low days in the Yr1215 despite the political circumstances. In addition, the results suggest that King John was

very active during 1214 and although some of this may have been in response to the growing unrest, it could equally suggest that his high activity may have precipitated or contributed to the crisis.

The seasonal analysis shows the King John exhibited seasonal changes such as high activity during spring and a bimodal distribution of low activity in spring and autumn which complies with the literature. (Eastwood and Peter, 1988, Cassidy and Carroll, 2002)

### 3. **Are changes only seen in travelling activity?**

Matching significant changes were also found in a comparative analysis of legal work undertaken by King John and a comparative analysis of administration. No matching changes were found when his alms giving in lieu of religious observance was analysed.

### 4. **Are the changes identified an anomaly of the CPA program?**

The internal analysis showed that the smoothing order did not influence the CPA findings. The external comparator - Bollinger Bands™ - also shows changes that are similar in pattern and period duration to those found by CPA. Further comparative analyses, which for example explore the concurrence of polarity between CPA and BB™ and the influence of the p value, are presented in Appendix 7.

### 5. **Is this just King John or is it seen in other itineraries?**

This analysis showed that the brothers' itineraries (King Richard vs. King John) were statistically similar but Peter des Roches' itinerary (non-familial comparator) was statistically difference despite travelling with King John for the majority of his journeys (68%). However, the results were based on relatively small numbers with high levels of uncertainty. On that understanding, the difference between familial and non-familial comparators suggests that there may be evidence of a familial trait with regard to travelling behaviour.

Taken together, this provides a weight of evidence so that the study therefore rejects the First Null Hypothesis to say that **King John of England does show changes in his travelling activity that would be expected in bipolar disorder in that**

- **periods of high and/or low travelling activity demonstrate features that characterise bipolar disorder periods.**
- **periods of high and/or low travelling activity are demonstrated by an alternative mathematical model**
- **comparable high and/or low activity is found in other activities carried out by King John**
- **comparable high and/or low travelling activity is found in either familial or non-familial comparators.**

## **Chapter 5: Evaluating Bipolar Symptoms using CPA**

The results of the Change Point Analysis can be used as a tool or crib to investigate the behaviour of King John. The latter term is borrowed from cryptanalysts who seek a crib that produces an intelligible plaintext version from an encoded message and then apply its rules to decode other encrypted communications. This study has identified high and low travelling periods - or possible bipolar periods - that together create a bipolar crib.

This chapter investigates accounts of potential bipolar symptoms and their temporal relationship to the CPA crib. As previously argued, diagnostic symptoms are no more likely to be found in compliant CPA periods, unless as evidence of bipolar disorder. This collation enables the study to create a medical history of King John and by so doing, investigate the second null hypothesis.

### **Null Hypothesis 2:**

***There is no historical corroborative evidence of bipolar disorder symptomatology associated with periods of significant change in King John's travelling activity.***

The study recognised however, that the CPA periods encompass 91.8% of the days of King John's reign and accounted for all dates during 1200 to 1208 and 1210 to 1216. This made the polarity of the identified period of additional importance to the study – the appropriateness of the symptoms to identified high periods of travelling or to the identified low periods of travelling – as such consistency would demonstrate diagnostic stability.

## **Method**

Historical corroborative evidence of possible symptoms was gathered first and then related to the CPA periods. Symptoms were presented with sufficient historical context to enable their evaluation: the analysis of circumstantial evidence, as it relates to CPA periods, is presented in Chapter 6.

The investigation sought accounts of likely bipolar symptoms from a sample of 21 primary, contemporary records, establishing where possible, the date(s) of occurrence from, for example, given Saint's days (see Table 21). These sources were preferred because of their closeness to events, since re-interpretation of the past in the light of subsequent events is a feature universal to human memory. (Anderson, 1995) p269,270 The term "contemporary" is used advisedly and the study acknowledges additional concerns surrounding the reliability of

some sources – both issues have already been described in the literature review (Chapter 2, Section 2.5.1),(Holt, 1963)p22 The study therefore explored the example of the chronicler, Roger of Wendover to present a means of assessing the reliability of his account (Appendix 8). Contrary to such concerns, the study found that Wendover exhibited 71– 86% accuracy over the span of King John's reign. While such reliability is only part of witness credibility, it provides some reassurance.

**Table 21: List of Primary Sources used in Chapter 5**

<b>Chroniclers &amp; others</b>	<b>Annals</b>
The Barnwell Chronicler	Bermondsey
Ralph of Coggeshall	Dunstable
Roger of Wendover *	Bury St Edmunds*
<i>Richard de Devizes</i>	Chester*
<i>Ralph Diceto</i>	<i>Burton-upon-Trent</i>
<i>Gervase of Canterbury</i>	<i>Tewkesbury</i>
<i>William le Breton</i>	<i>Margam</i>
ANONYMOUS OF BETHUNE (HISTOIRE DE DUCS DE NORMANDIE)	<i>Osney</i>
	<i>Worcester</i>
Roger de Hoveden	<i>Waverley</i>
	<i>Winchester</i>
	<i>St Aubin</i>
Code: <i>Latin</i> ; English translation available*; MEDIEVAL FRENCH	

Later sources, modern historical opinion or secondary analyses render evidence that is undoubtedly less immediate but which is able to determine longitudinal patterns of behaviour and long term interactions. They bring their own problems e.g. modern sources are limited by the survival of documentary evidence and influenced by current culture and mores. Despite these reservations, to exclude them would appear to deny the sedimentary principles of academic research. The study therefore explored these to obtain additional calendar references of potential bipolar symptoms. (Appendix 10: Bibliography)

Each Latin source was read for both sense and key words e.g. *ira et furore, anima, lachrymis, somnos* in order to identify potentially relevant accounts. If not already published (see texts marked \*), a translation was then made to ascertain its exact content using traditional published sources (Wright and Martin, 1773, Morwood, 1999, Jones and Sidwell, 1986, Latham, 1965) and electronic adjuncts i.e. BlitzLatin (White) and Google translate (GoogleTranslate). With regard to the later, direct electronic translations were not used by study but rather their functions in analysing the grammar and providing suggestions of alternative vocabulary. Datable events e.g. those related to feast days, were investigated in order to obtain a calendar reference. A similar process was used for sources published in

medieval French when the *Anglo-Norman-On-line Hub* was used as a vocabulary and grammar resource. (Trotter) A similar methodology was applied to later non-English sources e.g. Richard. (Richard, 1903)

Once identified, all behavioural evidence was classified by source (primary; secondary analysis; modern opinion) and placed in the context of the statistically significant and ICD-10 compliant CPA periods of acceptable internal uncertainty described in Chapter 4. The investigation also noted the "missing" bipolar features – those listed in guidelines but not in found by this investigation.

## **Results**

The results of the investigation that would inform the construction of a medical history are presented in four sections:

- 5.1 Character references**
- 5.2 Evidence for ICD-10 symptoms of mania**
- 5.3 Evidence for ICD-10 symptoms of depression**
- 5.4 Evidence of bipolar characteristics described in the literature**

### **5.1 Character References**

The study noted four character references from three reporters that places the king's behaviour in a global context.

Referring to the young prince (23y), Devizes suggested that John's temper or innate moods –depending on the preferred translation of "**mores**" – were already established and, by implication, worthy of note:

Johannes frater regis, qui solus ex filiis matris suae reginae Alienor fratri supererat, praeter comitatum de Moretonio, quem dono patris pridem perceperat, in tantum a fratre ditatus est et dilatatus in Anglia, quod in privatim et publice praedicabatur a pluribus regem de reditu in regnum non cogitare, quem frater jam eo non impotentior, **si innatos sibi mores non reprimat**, audebit actus dominandi libidine repulsum exturbare de regno.

(Stevenson, 1838) p7

John, the king's brother, who was the only remaining brother [and] son of their mother Queen Eleanor, made Count of Mortain by his father some time ago and being so much enriched and expanded in England by his brother, [an action] which many in private and in public praised, not considering [on] the king's return to the kingdom where [his] brother has become powerful **if he controls his innate temper**, he[John] will [/might] dare to lust after power and drive away and expel [the king] from the kingdom

(my translation)

Three years later in 1192, during a crisis in England following the return of the French king in advance of King Richard, Devizes reported that John's mother Eleanor considered her son to be light minded. As before this can also be rendered adolescent or juvenile, although John was 25ys old; perhaps at best, it would appear to be a judgement of political naivety:

*Comes Johannes, missis nunciis ad Portum Hamonis, mandavit praesto parari sibi navigium, ut putabatur, ad regem Francorum defecturus; sed regina, mater eius, metuens ne **levis animi adolescens** consiliis Francorum aliquid molitum iret in dominum suum et fretrem, anxia mente pertractat qua posset arte filii propositum imperdire.*

(Stevenson, 1838)p57

*Count John, sending messengers to Southampton, ordered that a ship should be made ready for himself so that it was thought that he was defecting to the French king. **But the queen, his mother, fearing lest the light minded youth**, by the counsels of the French, might attempt something against his lord and brother, with anxious mind explored the intentions of [her] son in order to communicate them with skill.*

(my translation)

Secondly, as king, the Paris-based writer William le Breton, described John as showing "the acts of fury which this unfortunate man could not prevent himself committing", a comment noted and translated by Petit-Dutaillis and already referenced by this study.(Petit-Dutaillis, 1936) p216.

*Jamque revestierat tellus se floribus, herbis  
Luxuriabat ager, medio plus tempora cursu  
Veris erant, cum rex iratus in arma cohortes  
Rursus agit, properans ut talio digna Johanni  
Tandem retribui possit pro morte nepotis,  
**pro tot furialibus actis,  
A quibus ille miser se refrenare nequibat.***

(Delaborde, 1885) p177.

And so the earth was adorned with flowers,  
the ground luxuriant with grass in the midst of that great surge toward  
Springtime, when the resentful king once again raised an armed force,  
quickly with apt retaliation against (to) John.

At long last he was able to repay for the death of his relative/scion

**for the many frenzied actions**

**from which that wretched man was unable to restrain himself.**

(my translation)

The chronicle was written retrospectively some time after the battle of Bouvines (27 July 1214;HIGH 27) given its early reference to that event (Delaborde, 1885p3, line32); Book 7, which contains the quotation near its start, commences with the fall of Gaillard (6 March 1203;

HIGH 8).(Delaborde, 1885)p177,lines 13–19. Following the quotation, Dutailis adds that "[a]ll the symptoms we have enumerated are those of the periodic psychosis or cyclothymia. Philip Augustus had a madman as his rival."(Petit-Dutailis, 1936)p216.

Lastly, the Barnwell chronicler, in recalling the king's death (aged 49y) in 1216, pondered:

*Ibi igitur morbo invalescente, diem clausit extremum xiiii kalendas Novembris, postquam regnaverat annis xvii mensibus v. diebus iii: princeps quidem magnus sed minus felix, et cum Mario fortunam utramque expertus; munificus et liberalis in exteris, sed suorum deprædator, plus in alienis quam in suis confidens, unde et a suis ante finem derelictus est, et in fine modicum luctus.*

(Stubbs, 1873) pp 231, 232

So therefore overwhelmed by illness he [John] met his end on 14th Kal. November, after reigning 17years, 5 months and 4 days: indeed a prince who was great but small in happiness and like Marius, each tested by circumstances; bountiful and liberal to foreigners but a plunderer of his own [countrymen], trusting more in foreigners than his own [countrymen], and from whom, and [including] his own countrymen, he was abandoned and in the end, little mourned.

(my translation)

Secondary sources also provide comment: Warren renders the key phrase as "A great prince certainly ... though scarcely [sic] a happy one".(Warren, 1978)p257. Church notes the Barnwell Chronicler's comparison with Caius Marius Coriolanus from "Plutarch's Lives". (Church, 2015)loc 104. This ancient text would have been well known to both the Barnwell Chronicler and his readers, as evidenced by a sole modern survivor from the library of the monastery of St. Germain-des-Prés, Loire (Lat/Long: 47.41,-0.8328), which dates from the 10th century.(Plutarch, 1923) Plutarch wrote:

*Marcus himself, however, remained unmoved. Proud and haughty as ever, he appeared not to be sorry for himself, and to be the only one of the patricians who was not. This calmness, however, was not due to any evenness of temper or any intention of bearing his wrongs meekly. **It arose from concentrated rage and fury, which many do not know to be an expression of great grief.** When the mind is inflamed with this passion, it casts out all ideas of submission or of quiet. Hence an angry man is courageous, just as a fever patient is hot, because of the inflamed throbbing excitement of his mind.*

(Plutarch, 1894)loc 6110, 6111.

Although King John's unhappiness could be taken as referring to his political crises i.e. the loss of Normandy and the civil war of 1215/16, it could equally refer to his mood. This later view gains support from the Barnwell Chronicler's choice of comparison, who exhibited "rage and

*fury*" as "an expression of great grief" or depression - a plausible, and *sotto voce*, allusion to mental illness.

## 5.2 Evidence for ICD-10 symptoms of mania

A collation of the findings is presented in Table 22.

**Table 22: ICD-10 symptoms of mania and the sources of evidence**

ICD-10 Symptom of mania		Evidence		
		Dateable Primary Source	Secondary Analysis	Modern Opinion
5.2.1	Increased activity pr physical restlessness			✓
5.2.2	Decreased need for sleep	✓		
5.2.3	Increased sexual energy or sexual indiscretions	✓		✓
5.2.4	Foolhardy or reckless behaviour whose risks the individual does not recognize	✓		✓
5.2.5	Inflated Self Esteem and Grandiosity	✓		✓
5.2.6	Increased talkativeness	<b>No evidence found</b>		
	Flight of ideas or thoughts racing			
	Difficulty in concentration or distractibility; constant changes in activity or plans			
	Loss of normal social inhibitions resulting in inappropriate behaviour			

### 5.2.1 Increased activity or physical restlessness

In addition to ICD-10, restlessness in mania was also noted by Kraepelin and recognised since the time of Hippocrates. (Kraepelin, 1921)loc.658, (Goodwin and Jamison, 2007)p3.

Evidence of increased activity is of course, the basis of the high activity periods identified by CPA analysis which attributed high activity to be greater than the median value of 8.45MAS. That aside, there are 24 specific instances of sudden long distance ventures where the moderated activity score is greater than 30 MAS, including 5 journeys when it is greater than 40 MAS. Of these, 15 (63%) show that he visited/issued documents at more than one location. These do not include other less obvious examples such as that to Le Mans (23 June 1202; **HIGH 5**) via L'Aigle and another day trip to L'Aigle (28 July 1202; **HIGH 6**) and which are noted without comment by Powicke, a scholar of the modern era.( (Powicke, 1913)p149. They might be explained on military grounds although the trip to Le Mans was in the diametrically opposite

direction to the active threat in the north, where Phillippe Auguste was investing Gournay-en-Bray, Seine-Maritime, as evidenced by both William le Breton from the French side and Wendover from England.(Delaborde, 1885)p161, (Coxe, 1841)p167. In addition, these trips are followed by King John's famous dash to Mirebeau ( 1 Aug 1202; HIGH 6) to rescue his mother.

Two years before these events, Powicke commented that "[t]hroughout the summer of 1200 [HIGH2,3] John devoted himself with extraordinary energy and success to the consolidation and government of his vast possessions."(Powicke, 1913)p140. Likewise, Richard, who wrote a modern collation of records of the Counts of Poitou, notes the physical toll of travelling, where the horses bore the brunt of the excessive workload:

*La maladie et la fatigue ayant épuisé les chevaux de son escorte, il fut en ce moment contraint de les remplacer; comme il était à court d'argent, il donna commission à Hubert de Bourgh, son chambrier, et à Guillaume de l'Etang d'emprunter 100 marcs d'argent aux marchands du pays, ensuite de quoi il leur ouvrit un crédit illimité pour acheter les chevaux qui lui seraient nécessaires.*

*(Richard, 1903)p376*

Illness and fatigue so exhausted the horses of his escort that he was now forced to replace them; as he was short of money, he commissioned Hubert de Bourgh, his chamberlain, and William of Etang to borrow 100 marks of silver from local merchants, after which he authorised unlimited funds to purchase horses as required.

(my translation)

However while these show increased activity with uncertain causality, there is no evidence of adverse contemporary comment. That is left to modern sources, such as when Powicke noted that the king

*[f]or some mysterious reason he left Rouen on Oct 7 1203 [HIGH 9]almost alone. After crossing the river by boat to Notre-Dame-du-Pré, he appears to have ridden in the day to Bonneville-sur Touque, an enormous distance even for him. Two days later he celebrated the feast of Saint Denis at Caen, with much drinking of wine.*

*(Powicke, 1913)p166.*

### **Comment**

Evidence of increased activity and physical restlessness is found in modern opinion but not in contemporary accounts. There is also inferential or circumstantial evidence from the travelling itinerary. All dateable accounts relate to periods of HIGH travelling activity.

### 5.2.2 Decreased need for sleep: changes in Circadian rhythm

Changes in circadian rhythm are viewed clinically as both a trigger (e.g. short sleep brings on a manic period) and a presentation (e.g. short sleep cycles occur during manic periods) of bipolar disorder, with a change in sleep duration of greater than 3h indicative of a change in polarity. (Salvatore et al., 2008, Murray and Harvey, 2010, Bauer et al., 2006)

Referring to the Christmas season (25 Dec 1215 to 4 Jan 1216 [**HIGH32 & 33**]), Wendover comments:

*Inter haec omnia, quae haronibus inferebantur, convitia, jacebant ipsi in villa Londoniarum mulierum more parturientium, sollicite cogitantes de cibariis et poculis...; sed, illis dormientibus, **rex non dormivit**, dum terras eorum et possessiones omnes, castra et municipia, a mari australi usque ad mare Scoticum in suam potestatem recepit.*

(Coxe, 1841)p352.

*Amidst all these sufferings which were occasioned by the barons, they themselves were lying in the city of London like women in labour, giving all their attention to their food and drink...: but, although they slumbered, **the king slept not**, until he had got all their lands and possessions, castles and towns in his own power from the southern to the Scotch sea*

(Giles, 1849)p352.

This evidence could be justifiably attributed to a colloquialism or equally as an appropriate response to the civil war post Magna Carta, although it is synchronous with two compliant high periods. In addition, the inverse evidence – excessive sleeping during low activity periods – can also be demonstrated (see Section 5.2.4).

#### **Comment**

Wendover provides dated comments on King John's sleeping which by themselves could have an alternate causation. However when taken in conjunction with other circumstantial evidence and dateable evidence relating to two periods of **HIGH** travelling activity, are plausible bipolar symptoms. Moreover, there is evidence of the reverse finding of prolonged sleeping during low travelling periods (see Section 5.3.4).

### 5.2.3 Increased sexual energy or sexual indiscretions

Sexual arousal is a common feature of mania, being demonstrated both in "lewdness and shamelessness" and "hasty engagements."(Goodwin and Jamison, 2007, Kraepelin, 1921)loc593. The evidence for both types of behaviour was considered.

### ***Lewdness and Shamelessness***

Sometime before the fall of Gaillard on 6 March 1204 [HIGH10], the chronicler Roger of Wendover says:

*Quod cum regi Anglorum nuntiatum fuisset, omnimodis cum regina sua vivebat deliciis, cum qua simul se credidit omnia possidere; habebat praeterea spem in immensitate pecuniae quam collegerat, quasi per ipsam posset terras quas amiserat revocare.*

(Coxe, 1841)p181.

*"he was enjoying all the pleasures of life with his queen... moreover, he felt confidence in the immensity of the wealth he had collected, as if by that he could regain the territory he had lost.."*

(Giles, 1849)p214.

Although equally viewed as a sexual innuendo, a mundane interpretation of "*all the pleasures of life with his queen*" might simply indicate that John preferred the company of his queen, and the quietness and privacy of her chambers to the bustle of the great hall. This belief is bolstered by later reports by the Anonymous of Bethune who noted:

*Toute tourna s' entente en deduit de chiens et d'oisiaus et à conjoir la roine sa feme, que il moultz amoit; et non porquant si li disoit - elle mainte retraite et mainte felesesse parole*

(Michel, 1840)p104.

He [John] held many tournaments, was diverted by the dogs and hunting birds and the pleasures of the queen his wife, whom he very much loved [/spoiled]; and nevertheless this [/perhaps because of this] if he spoke to her she was persistently contrary and was persistently cheeky when she spoke.

(my translation)

Modern opinion appears to be divided on King John's sexual appetites. Painter, a modern historian suggests that "[t]he contemporary chroniclers are almost unanimous in agreeing that John was lustful and adulterous", even if this unanimity only extends to 5 sources: William of Newburgh, who stopped writing in 1198; Wendover and the Anonymous of Bethune who were contemporary with King John's reign; the likewise contemporary but "*hysterical*" Gerald Cambrensis and the later *Chronica de Melsa* (written from 1339). (Painter, 1949)p232; (Holt, 1963)p12. In addition, Gillingham, an historian contemporary with Painter and citing the same Anonymous of Bethune, states that contemporaries did not accuse King John of "*sexual profligacy*" rather "*that he dishonoured some of the powerful men in his kingdom by subjecting their wives and daughters to forceful sexual harassment.*"(Gillingham, 2010)p38. This is a clear indictment of the king although the volume of outrage could equally indicate the level of resentment of the cuckolded husbands rather than a genuine complaint of forced imposition by their ravished wives. This notion is bolstered by evidence that King John sent one

lady friend a "*chaplet of roses*" and on another occasion, "*a dress*".(Cole, 1844)p 234, 267. This does not appear to be the behaviour of a sexual predator but perhaps a description of the "*inter-personal charm*" that is associated with mania.(Goodwin and Jamison, 2007)p402. Irrespective of the motivation, the outcome of his liaisons is irrefutable: King John had 7 identifiable bastards in comparison to 1 by his brother Richard, 3 by his father Henry II and 20 by his Norman great-grandfather, Henry the first.(Given-Wilson and Curteis, 1984)p179.

Translational and contextual issues may also have given rise to unlikely accounts of the king's sexual appetites. For example, Gillingham translates an account by the Anonymous of Bethune who records John's wife Isabella as saying "*I really think you are keen to be a king who is mated in a corner*" (Gillingham, 2010)p40 , whereas the wider context reads:

*... li dist-il « Dame, ne vous cant; car, par la foi que je doi vous, encore sai-jou.i. tel angle ù vous n'ariés garde del roi de France devant .x. ans, ne tout son pooir.»*

*« Ciertes, sire, dist elle, je croi bien ke vous estes moult desirans à estre rois qui soit matés en l'angle.»*

*(Michel, 1840)p104*

... he said to her " Lady, don't crow, for I owe you this time, again well played. [Score] "1". Such deviousness where you would batter down the defences of the King of France within 10 years, despite all his wealth.

"Certainly, My Lord", she replied "I well believe that you are delighted to be the king who was checkmated by a sly move." [or: I know only too well that you enjoy being beaten by a sly move, despite being king!]"

(my translation)

Chess "*enjoyed a popularity from the twelfth to the fifteenth centuries which it never attained again*".(Gamer, 1954) It was scored with a victory earning one point and "*was a favourite of Kings Henry I, Henry II, John, and Richard I of England, of Philip II and Alfonso X (the Wise) of Spain, and of Ivan IV (the Terrible) of Russia.*"(EncyclopædiaBritannicaOnline, 2002) Whilst perhaps accepting the *double entendre*, King John's rueful congratulations and the record of the correct chess score places the conversation around the board, not the bed.

Another possible example of mistranslation might be the interpretation of Gevase's comment : *Reginam quoque sponsam suam sub arta posuit custodia in castello de Corf* (Stubbs, 1880)p102. This comment was made during the Queen's second pregnancy with Richard (born 5 Jan 1209, at Winchester). Rather than suggesting that King John placed his wife in custody under close surveillance during 1208, it can also be rendered as: He [King John] has placed the queen his wife during her confinement in the protection of Corf castle. (my translation)

### **"Hasty Engagements"**

John had married his cousin in 1189 although this never received the required papal dispensation because of consanguinity and was probably never consummated. To obtain a divorce, Warren, a modern historian suggests that John nevertheless submitted himself to two church adjudication panels – one convened in Normandy (1199) and the other in Aquitaine (1200) – who both held in his favour. (Warren, 1978)p66. If the later council was held within its jurisdiction and required his attendance in person, then the itinerary would indicate that the earliest date would have been 4 July 1200 [HIGH2] at Poitiers (12.7 MAS), although it could equally be argued that it was held in Bordeaux (14 & 18 July; HIGH 2) and chaired by the local bishop.

According to Turner and other modern historians, it perplexed "*contemporaries* [who] were at a loss to explain John's actions", when he met (*circa* 5 July 1200 ; HIGH2 ) and married (*circa* 24-30 August 1200 HIGH3) the twelve year old heiress to the County of Angouleme during his "*royal wanderings in Aquitaine*". (Turner, 1994)p88, (Danziger and Gillingham, 2003)p157, (Powicke, 1913)p140,141. Contemporary sources however, present a plausible motive with Wendover, Coggleshall, the Annalist of Burton and Roger de Hovenden all saying that the marriage took place on the advice of the French king. Indeed, having sworn fealty to King Philip for his continental lands as part of the Treaty of Le Goulet, and having shown his willingness to conform to their terms by denying the inheritance of his nephew Otto, it would have been strange for King John not to have obtained his overlord's consent. (Luard, 1864)p202. Equally, this does not conflict with the evidence provided by Diceto of the king's divorce in 1199 that negotiations for a Portuguese marriage had been opened on 30 Jan 1200. (Hardy, 1837)p58b; (Stubbs, 1876)p 166,167,170, (Cazel and Painter, 1948).

Hovenden also adds that "*the father of the damsel, on seeing that John had a fancy for her, took her out of the custody of Hugh le Brun and gave her in marriage to John, king of England.*" (Giles, 1849)p188, (Stevenson, 1875)p103, (Riley, 1853)p483 However, although this implies a sexual motivation and the accusation "*that the king may have been guilty not only of cruelty and murder but even, possibly, of child-molesting*", his subsequent conduct and events belie this. (Vincent in (Gillingham et al., 1999) p175. The Anonymous of Bethune notes that King John spoiled his cheeky, clever wife. Likewise, their first child was born seven years later which, if the lowest marriageable age at the time was 12, meant that Isabella was a respectable *primigravida* of 19 years.

The marriage is also noted by the Annalists of Margam, Osney, Waverley, Worcester and the Anonymous of Bethune, although the Annalist of Dunstaple places the marriage and their subsequent joint coronation in the following year. (Luard, 1864)p25, (Luard, 1865)pp 252,74, (Luard, 1869)p50, (Michel, 1840)p91, (Luard, 1866)p28. The Annalist of Bury records the precise date of the marriage as being on St Bartholomew's Day (24 Aug 1200; **HIGH3**); Roger de Hovenden places the ceremony at Angouleme and conducted by Elias Archbishop of Bordeaux who had also granted the king's divorce, and the itinerary does contradict these assertions. (Arnold, 1892)p8 (Riley, 1853)p483 It is perhaps worth noting that although the Anonymous of Bethune was probably physically closest to events, he does not mention the influence of the French king.

Equally, there is no insinuation that this was a marriage by force, a scenario that was real threat to an heiress as seen when Eleanor of Aquitaine eluded two "wife-hunter[s]" after her divorce from Louis and en route to Henry. (Owen, 1993)p31 Instead, if the modern account from the *Histoire de les Comtes de Poitou* is to be believed, the court gathered for the marriage (24 Aug at Angouleme, **HIGH3**) between Isabel and Hugh Le Brun who were already affianced, only to have King John marry the bride himself in an act of spontaneous passion.

*En la voyant, Jean aurait été pris d'une de ces ardeurs sauvages çui s'harmonisent si bien avec le caractère qu'on lui connaît et il aurait voulu à toute force la jeune comtesse pour lui-même. Au moment de la célébration du mariage, il l'aurait arrachée des bras de celui qui allait devenir son époux et Hugues de Lusignan, incapable de résister aux forces du roi, aurait été contraint de se retirer.*

(Richard, 1903) p379

*On seeing her, John was filled with the wild passion that was so typical of his known character and wanted at all costs the Countess for himself. At the moment of celebration of the marriage, he would have torn her from the arms of her future husband and Hugh de Lusignan, unable to stand against the king's powers would have been forced to withdraw.*

(my translation)

Another explanation of the king's action might explain it in terms of personal animosity, provoked by Hugh's temporary detention of the king's mother during the previous year. (Richard, 1903)p367, 380. However, such a personal response to a political incident is probably less likely. Strategically, the marriage stopped the merger of two ancient antagonists of the house of Anjou, namely the Houses of Angouleme and Luisgnan which not only would have been united in the following generation but would have resolved their disputed claims over the County of La Marche. This could have been a significant political incentive but King John was not adverse to their reconciliation: it had been included in the Treaty of Le Goulet (May

1200; **Low1/HIGH2**) and he had personally overseen its renewal a few weeks previously at Lusignan on 5th July [**HIGH2**]. (Hardy, 1837)pp58b,59a, (Powicke, 1913)pp140,141. Perhaps King John relied too heavily on this legal instrument, repeating his trust in the binding power of a written contract which is also evident in his dealings with King Philip: when Philip broke the terms of the Treaty of Le Goulet, the Pope had to order John to breach his side and support his nephew Otto.(Cheney and Semple, 1953)p24. Moreover, by marrying Hugh le Brun's fiancée and displaying such a very public disregard of Lusignan pride, King John gave them no opportunity for saving face.

Whatever the true explanation, King John's marriage to Isabella invited trouble from a family who were "*disciplined in rebellion*" and skilled in political provocation which occurred as soon as 6 March 1201.[**HIGH4**] (Powicke, 1913)p142 Whenever the exact wedding date, the Portuguese negotiations disappear from the subsequent record. Whichever the chosen suitor, Isabella's father appears to have been content with the outcome given his subsequent unwavering support of King John.

### ***Comment***

Wendover blames King John's preference for his wife's company for his inaction in saving Normandy. Other examples of excessive or inappropriate sexual appetites have plausible alternative explanations. The vocal irritation of the barons with regard to their wives might infer multiple royal liaisons. However, although the exact motivation for his marriage to Isabella is unclear and contemporary explanations may have been inferred, it was undoubtedly hasty. All dateable accounts bar one, relate to **HIGH** periods of travel, where May 1200 covers **Low1** and **High2**.

### ***5.2 4 Foolhardy or reckless behaviour whose risks the individual does not recognize***

The same quotation already quoted from Roger of Wendover [**High10**] also illustrates "foolhardy or reckless behaviour whose risks the individual does not recognise", suggesting that the king misplaced his confidence in his ability to fund mercenary support:

*Quod cum regi Anglorum nuntiatum fuisset, omnimodis cum regina sua vivebat deliciis, cum qua simul se credit omnia possidere; habebat*

*praeterea spem in immensitate pecuniae quam collegerat, quasi per ipsam posset terras quas amiserat revocare.*

(Coxe, 1841)p181

*he was enjoying all the pleasures of life with his queen... moreover, he felt confidence in the immensity of the wealth he had collected, as if by that he could regain the territory he had lost.*

(Giles, 1849)p214

These comments are also prefaced by others by Wendover made in similar vein, suggesting that the king's misplaced confidence led to his abandonment by the barons [HIGH10]:

*"Sinite illum facere, ego, quicquid modo rapit, uno die recuperabo;" ... Comites vero et barones et alii de regno Angliae nobiles, qui ei eatenus fideliter adhaeserant, talia audientes eiusque desidiam incorrigibilem intelligentes, impetrata licentia, quasi illico reversuri, remearunt ad propria, rege cum paucis admodum militibus in Normannia derelicto.*

(Coxe, 1841)p171, 172

*"Let him do so; whatever he now seizes on I will one day recover" and neither these messengers, nor others who brought him like news, could obtain any other answer ... when they [earls and barons of England] heard his words and saw his incorrigible idleness, [they] obtained his permission and returned home pretending that they would come back to him and so left the king with only a few soldiers in Normandy.*

(Giles, 1849)p207

Recklessness might also be inferred from high-handed behaviour and there is evidence that King John was heavy handed in the exercise of justice during Winter 1200/01 [HIGH4]. Stenton, a modern historian writes: *"No justice uninstructed from above would surely impose so heavy a fine as 100 marks for a trespass"* and notes *"Howden's indignation at the fines imposed on northerners for forest offences while the king was perambulating the north in winter."* (Stenton, 1952)Vol1,p121. Likewise, following his success at Mirebeau (Aug1202, HIGH6), the King's high handed attitude to the ambitious William des Roches led to his subsequent defection to the French king, along with Amery of Thouars, that "weathercock of fortune". This started a haemorrhage of baronial support in Poitou and Anjou.(Powicke, 1913)p153.

Recklessness might equally appear as arrogance, a term used by the writer of William Marshal's Histoire who noted: *"But all the time the King's pride and arrogance increased; they so blurred his vision that he could not see reason."*(Holden and Gregory, 2002)lines 12500-03.

*"Risks the individual does not recognize"* might be seen as poor political judgement, as shown by the king's over-optimism in the loyalty of the Lusignan family and William des

Roches, his lack political foresight in the destruction of Dol, which further inflamed the Bretons or his excursion to Norham (1209) which was both unexpected by the Scots and unwelcomed by his barons and army. If the bipolar thesis is upheld for a moment, King John's thinking may have been coloured by high creativity and complexity, and his understanding confounded by the "*impaired perception of facial emotion*" especially that of disgust, an emotion that might have been registered by the barons. (Lembke and Ketter, 2002)

### **Comment**

Wendover appears to consider that King John indulged in reckless behaviour and implied that the king was not aware of his misjudgment. Behaviour that appears high-handed is found in King John's exercise of justice, his interpersonal relationships and his military ventures, and is suggestive of both recklessness and lack of insight. All dateable accounts relate to periods of **HIGH** travelling activity.

### **5.2.5 Inflated Self Esteem and Grandiosity**

Inflated self esteem and grandiosity in a king is perhaps difficult to differentiate from royal pomp and pageant, although that may be a modern expectation. King John's father Henry II, was first crowned on 19th Dec 1154 and then held three ceremonies within short succession during 1157/58 (Bury St Edmunds (19th May 1157); outside Lincoln (25 Dec. 1157) with his last at Worcester (17 July 1158).(Eyton, 1878)pp1,26,31,&35. Gillingham, a modern historian, notes that while regular crown wearing at the major festivals had been customary with the Norman kings, its practice had been discarded by Henry II. Despite this, his brother Richard held a crown wearing ceremony with the King of Scots at Winchester on 17 April 1194. (Gillingham, 1978)p242.

Against this backdrop, King John was first crowned on 27 May 1199 and again at Westminster with his Queen on 8 Oct 1200 [**LOW2**]. According to Norgate, a modern historian, crown-wearing became part of repeated acts of high ceremony including Easter 1201 at Canterbury (25March 1201,[**HIGH 4**]).(Norgate, 1902)loc929, 1132, 1147. However the exact number of these events has not been established by this study although Turner infers their repetition and describes their context:

*John's lack of proportion ... at one moment to enhance the royal dignity, undone by his "indecent levity" at another. He sported splendid trappings ... celebrating feast days with crown-wearing....*

(Turner, 1994)p16.

Equally for example, Church has suggested that since John was transporting the crown and regalia he "*planned to have a crown-wearing ceremony and since he was in York on 30 and 31 August [1212], it is likely that this is where it took place.*" **[HIGH21]**

Other circumstantial evidence of grandiosity might be postulated from King John's expansive hospitality before the aborted venture against the Count d'Eu and his Lusignan relatives: the "*ten tuns*" [of wine] which was consumed "*on the hill of Porchester [9-14 May 1201 Low3] in Southampton, in the king's departure ... and two and two at Fareham, and three at Brockenhurst, and three on the king's ship.*" – a total of 20 tuns where 1tun=982litres=1,309 modern bottles.(Stenton, 1937)pp xii, 84,123,124.

Inflated self-esteem is also associated with overconfidence, although this can sometimes only be inferred, such as King John's leisurely response to the rebellious activities of the Count of Eu during Spring 1201 **[High4]**. Wendover comments have already been noted but in this context demonstrate not only the inappropriateness of his self belief: "*Let him do so; whatever he now seizes on I will one day recover*" but its fixity: "*neither these messengers, nor others who brought him like news, could obtain any other answer*". This comes close to satisfying the clinical criteria for a delusion:

*a belief that is held firmly but on inadequate grounds, is not affected by rational argument or evidence to the contrary, and is not a conventional belief that the person might be expected to hold given his cultural background and level of education.*

(Gelder, 2005)p6

Perhaps another example of King John's overconfidence is the so-called veiled reference to Arthur's death sent as a verbal message to his mother on 16th April 1203 **[HIGH 8]** where a measure of reserve might have been more appropriate, as might the use of a closed letter rather than a patent one.(Church, 2015)loc1891. Equally, King John's heavy handedness is discussed in Section 5.4.1 and could also be regarded as a marker of inflated self-esteem.

### **Comment**

Again Wendover is the primary source of evidence for inflated self-esteem or grandiosity with the suggestion that the king's self-belief bordered on a delusional state. Later sources and opinion provide circumstantial evidence of high ceremonial events and liberal hospitality. All

dateable accounts relate to periods of **HIGH** travelling activity except for the second coronation (8 Oct 1200 [**Low2**]) which, it could be argued, was different in nature to crown wearing and done to ensure the status of his second wife. Likewise although the wine was drunk during 9-14 May 1201 [**Low3**], it was undoubtedly ordered during [**HIGH4**] which ends 7 May 1201.

### ***Mania Symptoms NOT found***

Evidence for the following ICD-10 symptoms was not found:

- Increased talkativeness
- Flight of ideas or thoughts racing
- Difficulty in concentration or distractibility; constant changes in activity or plans
- Loss of normal social inhibitions resulting in inappropriate behaviour

Contemporary comment about King John is mainly from writers who were reporting second hand. Extreme behaviours relating to 1 and 2 above might have provoked comment in eyewitnesses but may not have been deemed important enough to write down. Flight of ideas or racing thoughts (3) is not easily observable without direct questioning. The last symptom (4) has a number of elements of which some are considered later i.e. difficulty in concentration or distractibility. In considering the requirement for "*constant changes in activity or plans*", this is predicated on knowing the original plans and understanding how they continued to constantly change. This evidence is provided by the CPA analysis but is unlikely to be found in the textual sources that were distant from the court.

### 5.3 Evidence for ICD-10 symptoms of Depression

A collation of the findings is presented in Table 23:

**Table 23: ICD-10 symptoms of depression and the sources of evidence**

ICD-10 Symptom of depression		Evidence		
		Dateable Primary Source	Secondary Analysis	Modern Opinion
5.3.1	Decreased energy or Increased fatiguability	✓		✓
5.3.2	Diminished ability to think or concentrate e.g. indecisiveness or vacillation	✓		
5.3.3	Change in psychomotor activity with agitation or retardation	✓	✓	✓
5.3.4	Sleep disturbance of any type	✓		
5.3.5	Depressed mood	<b>No evidence found</b>		
	Loss of interest or pleasure			
	Loss of confidence or self esteem			
	Unreasonable self reproach or excessive guilt			
	Recurrent thoughts of death or suicide/suicidal behaviour			
	Change in appetite with weight change			

#### 5.3.1 Decreased Energy or Increased Fatiguability

Hand in hand with increased sleeping, depressed patients frequently complain of being tired all the time.

Wendover speaks of King John's "*incorrigible idleness*" [LOW6] (see mania for full quotation) and the long term political consequences of this behaviour. It is argued that Wendover's account encompasses more than one identified CPA period, with inaccuracy in their temporal sequence arising because he was unaware of their medical significance. This is a common finding when taking a medical history, when motive is attributed to behaviour in order to explain it and the sequence of events is subsumed to that purpose. Equally it is argued, that idleness cannot be equated to laziness, given both his and the family's reputation, and the evidence of administration which underpins the itinerary. This is perhaps most evident during the period from 20 June to 17 July 1203 [LOW6/HIGH9] when King John did not stir from Rouen yet issued documents daily. The outcome of the king's behaviour however, is not in doubt with his vacillation, and not his alleged tyranny, repelling the English barons. Powicke describes the time as:

"...the beginning of the end. John's fury gradually gave way to fits of lethargy, interrupted by moods of suspicion, by which the fidelity of none, from the earl of Chester downwards, was untouched."

(Powicke, 1913)p158.

### **Comment**

The evidence for increased fatiguability was found in one contemporary source and in comments by modern opinion. Both dateable accounts relate to periods of **LOW** travelling activity although one also overlaps with **High9**.

### **5.3.2 Diminished ability to think or concentrate**

Roger of Coggeshall, a Cistercian monk, records a dateable entry (23–25 Nov 1200; [**LOW 2**]) that recounts in detail the circumstances surrounding the negotiations of the Abbots of his monastic order with King John. He notes that the king initially deferred their meeting on the 23rd Nov by saying: "*precor ne me hodie iratum reddas, quia flebotomari proposui*" (Stevenson, 1875)p107. (I pray you, don't make me angry today, because I have agreed to be bled.(my translation)). Bloodletting was a significant medical treatment for a wide variety of ailments but, it would appear, not undertaken lightly.(see Chapter2,p19) So the parties met after Mass on Sunday 26th Nov 1200 [**LOW2**] :

*"...et pace ordinis tractavit. Cumque abbates ingrederentur surrexit, et in secretius cubiculum cum duobus aut tribus tantum proceribus secessit, ibique diutius de illo negotio et stabili pace ordinis tractavit, ac pietatis opera, quae in sacro ordine indesinenter peraguntur, cum eisdem replicavit. ....*

*Post aliquantulam temporis moram rex ad illos ingressus sonora voce sciscitatur: " Et ubi est dominus et pater noster archiepiscopus? Et accersito illo, mox cum eo et cum episcopis secretius colloquitur, abbatibus seorsim interim in camera illa astantibus. Deinde convocatis coram rege abbatibus, jubet rex archiepiscopum ut abbates alloquatur et consilium eius atque voluntatem eis denunciaret. Archiepiscopus vero dominum regem precatur ut ipse potius praesentes alloquatur; quo abnuente et se excusante, quod pro pietatis miseratione eosdem alloqui non possit, monet iterum rex ut verbum edicat, cui ex officio paternae sollicitudinis filios alloqui incumberebat."*

(Stevenson, 1875)p108.

and discussed a peace agreement. Whenever the abbots were engaging he [King John] arose and withdrew to a private inner great room with two or three noblemen, and there a long time he discussed of the arrangement of that business and firm agreement and the onus of responsibilities which are incessantly required by the holy order, he went over and over with the same. After a small pause of time, the king questioning those advancing loud voices, "But where is our lord and father Archbishop?" And summoning him, soon with him and with the bishops spoke privately, at the same time with the abbots

standing separately in that private room. Then with the assembled court of the king with the abbots, the king announced the appointment of the archbishop that he may speak to and debate with and offer his goodwill to the abbots. The archbishop truly entreated the king rather he in person should be present to speak to, who refused and excused himself, [saying] he was not able for the responsibility with the same pity to speak to, the king reminded again and reiterated his words, driven by duty and [like] a fatherly concern as towards his sons.

(my translation)

Coggeshall continues with a brief speech of reassurance by the Archbishop to the Abbots who, when they heard its content, agreed its terms, after which:

*mox rex ad pedes eorum se humiliter prostravit ac lachrymis faciem regavit*  
(Stevenson, 1875)p109.

"then the king prostrated himself with humility at their feet and tears wet his face"

(my translation)

The Barnwell chronicler, a member of the Augustinian monastic order, also comments on events saying "*et rex ipse, Divina inspirante gratia, cecidit pronus in terram ante pedes eorum*" (and the king himself, inspired by Divine grace, fell forward onto the ground in front of their feet (my translation)).

This story offers some contextual evidence of diminished ability to think or concentrate with the king discussing the arrangements over and over again before delegating responsibility. The events are bracketed by a significant medical intervention and a surprising personal royal response which was sufficiently unkingly to provoke comment by two chroniclers. It stands in sharp contrast to King John's use of humour to diffuse baronial anxieties, an example of which occurred sometime after the surrender of Rouen (24 June 1204; [HIGH 11] (Powicke, 1913) p262,263) and was recorded by the Anonymous of Bethune:

*Un jor assambla tout son conseil, si lor moustra les requestes que si baron li faisoient et lor en demanda conseil. Bauduins de Biethune, li cuens d'Aubemalle, qui moult estoit preudom et loiaus et boins chevaliers, mais si estoit mehaigniers de la goute artetyque que il ne pooit aler 1 pas ains le couvenoit poerter; et de chou pooit moult peser au roi Jehan car moult l'avoit adies trouve loial et feel. Chil parla premierement devant toz et dist au roi" Comment sire, vos requierent-il que vous lor donnes congie d'aler au roi de France requerre lor terres que pierdues ont en Normendie et ke lor cors soient deviers le roi de France encontre vous, et lo cuer soient devier vous" " Oil dist li rois, che me requierent-il" Ciertes che dist lu cuens, je ne sai que vous en feres; mais se jou estoie comme de vous, et los cors fussent contre moi , et lor cuer deviers moi, se jou les cuers dont li cors seroient contre moi tenoie en mes mains, je les jeteroie toz en une orde longagne" De cele parol fe moult ris, et si ne fu pas adont cele chose sommee, por la parole que li cuens dist;*

*mais puis donna li rois au conte de Warendem son cousin, la ville d'Estanford qui molt est boine, par eschange de sa terre ke perdue avoit.*

(Michel, 1840)p100.

The barons held counsel including Baldwin de Bethune who was the pre-eminent knight but damaged by inflamed gout and who was chosen to settle with King John because he had stuck [to King John's cause] and had shown loyalty and fealty. He spoke first in front of all and said to the king, "How Sir, they ask if you would give them permission to go to the king of France and demand your lands that are lost in Normandy and so that their presence might change the king of France to your favour, and your noblemen return to you." "Yes", said the king, "they require that of me". "Certainly that", he continued, "I do not know how you will enforce that ( lit. in iron); but if this is the game you are suggesting and the argument is against me, and [my] noblemen turning against me, this game where the noblemen who have sworn fealty ( lit: held in my hands) [yet] turned their hearts against me,[then] I throw them all over for such a despicable win." That speech produced many smiles, and if it did not make clear (lit. faire a donner) the main point of the thing, he spoke [more] on the subject to the barons; but then the king gave his cousin the Count of Warren, the town of Stamford, a good deal, in exchange for the land that he had lost.

*my translation*

### **Comment**

There is evidence from two contemporaneous accounts that suggests that the king was unable to fully undertake his royal duties. The study cannot find any modern reference to King John's prostration and tears and notes that these lines are absent in a published translation. (Hallam, 1995)p266. The dateable account relates to CPA period [LOW2]. A third chronicler describes behaviour that is completely different to the events of November 1200 during a period of opposite polarity.

### **5.3.3 Change in psychomotor activity with agitation or retardation**

Evidence of decreased activity is of course, the basis of the low activity periods identified by CPA analysis.

In addition to Wendover's comment quoted before concerning the king's "*incorrigible idleness*", he lays full responsibility for the ensuing loss of Normandy with the king: "*Videns tandem rex Johannes defectum sum,...*" (Coxe, 1841)p173. ("*King John at length seeing his fault...*"(Giles, 1849)p208) Coggeshall also makes comment, although attributes a different motive: "*eo quod suorum prodicionem semper timeret*" (Stevenson, 1875)p144, (because he feared his own treason (my translation)).

Indirect evidence of change can also be found from analysis of King John's legal activity. On the 6 Oct 1200 [LOW2] King John returned to England, but in contrast to his previous enthusiasm, he delayed and indeed "*[i]t is difficult to come to a decision as to the precise point in the king's itinerary that Curia Regis Roll 21 was begun*" , the Curia Regis Roll 21 being the relevant legal documentary source. (Stenton, 1952)Vol1 p96, 97. Despite this, at least one case from Kent, which had been remitted by justices in September 1200 to the 6 November [LOW2] for a hearing by the King, was subsequently adjourned to the 22 November [LOW2]. Stenton excuses King John citing his meeting at Lincoln with William of Scotland, the funeral of St Hugh of Lincoln (16th Nov, [LOW 2]) and the negotiations with the Cistercians before concluding that "*[i]t seems unlikely that the king with so many preoccupations at Lincoln can have given much thought to the work of the Judges in his train*" and that during this period "*the [legal] court [is] held where the king is, but only rarely is it held in his presence*". (Stenton, 1952)Vol1,p99,100.

Evidence of agitation, the study has postulated, might be found when high volatility occurs during low activity periods.(see Section 4.3.4 and Appendix 7: Bollinger Bands.) The clinical significance of this conjunction of symptoms is that depressed patients may have sufficient "energy" to self harm, rather than being subject to the more usual poverty of movement. The analysis in Section 4.3.4 (see p125) found this pattern at the start of 10 low periods and at the end of 3 others: one period [LOW 14] showed the conjunction at both its start and end. This methodology is unvalidated but suggestive, and is corroborated by evidence from other symptoms as shown in Table 24. In addition, [LOW 2] is associated with public weeping and being bled by his physicians following bereavement (see Section 5.4.6); [LOW 21] is associated with accounts of the king's agitation following bereavement (see Section 5.4.10).

**Table 24: Comparison of Agitation at start of CPA period with other symptoms**

SYMPTOM	[CPA Low Periods ]																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Agitation at start of CPA period ?	1	1	1			1				1	1		1	1				1	1			
Agitation at end of CPA period?				1	1									1								1
Decreased energy or Increased fatiguability						1																
Diminished ability to think or concentrate		1																				
Change in psychomotor activity with agitation or retardation		1			1																	
Sleep disturbance of any type																						

**Comment**

Two contemporary chroniclers note King John's inactivity associated with the loss of Normandy and the subject has attracted an extensive corpus of modern interpretation (See Chapters 1 & 2). There is also indirect evidence from the legal records of low activity which is in contrast to his previous enthusiasm. Evidence of agitation is postulated by an unvalidated methodology but which is corroborated by the association of other symptoms.

**5.3.4 Changes in Circadian rhythm**

In depressed periods, the circadian rhythm is altered often presenting with increased sleeping. (ICD-10, 2010) During the Christmas period 1202 (25 Dec 1202 – 4 Jan 1202; **LOW 5**), Wendover records:

*ubi, postpositis incursionibus bellicis, cum regina epulabatur quotidie splendide, somnosque matutinales usque ad prandendi horam protraxit.*

(Coxe, 1841)p171.

*“ where, laying aside all thoughts of war, he feasted sumptuously with his queen daily and prolonged his sleep in the morning till breakfast time.”*

(Giles, 1849)p206.

What constituted breakfast and more importantly, its precise timing appears to be a matter of some conjecture but Wendover's account of sleeping "*till breakfast time*" clearly infers that

King John should have been up already. (MedievalCookery) In addition, having demonstrated some evidence for decreased sleep during high periods, it is argued that the weight of the combined evidence is greater than the sum of their parts.

### ***Comment***

One contemporary chronicler makes specific comment on excessive sleeping during a low period of travelling.

### ***5.3.5 Depression Symptoms NOT found***

1. Depressed mood
2. Loss of interest or pleasure
3. Loss of confidence or self esteem
4. Unreasonable self reproach or excessive guilt
5. Recurrent thoughts of death or suicide/suicidal behaviour
6. Change in appetite with weight change

The first five symptoms are difficult to evaluate without direct questioning of the subject and the last without direct observation. None, with the possible exception of the last, was likely to have become known to hearsay witnesses such as the chroniclers. As such, their identification lies beyond the power of this study although (4) *thoughts of suicide or suicidal behaviour* might be more likely during low CPA periods with high volatility, which the study suggests may be a marker of agitation (See Section 5.3.3).

## 5.4 Evidence of Bipolar characteristics as described in Bipolar literature

A collation of the findings is presented in Table 25.

**Table 25: ICD-10 symptoms of bipolar characteristics and the sources of evidence**

Symptom described in literature		Evidence		
		Dateable Primary Source	Secondary Analysis*	Historical Opinion
5.4.1	Heightened capacity for work		✓	
5.4.2	Anger	✓		
5.4.3	Homicide	✓		✓
5.4.4	Affect: appropriate & incongruent	✓		✓
5.4.5	Blame	✓		
5.4.6	Tearfulness	✓		
5.4.7	Suspiciousness	✓		✓
5.4.8	Switching	✓		
5.4.9	Association with alcohol		✓	✓
5.4.10	Association with bereavement	✓		✓

\* Secondary analysis by modern historians showing patterns of behaviour over time

### 5.4.1 Heightened capacity for work

In his description of the emotional features of mania, Kraepelin noted *"the feeling of heightened capacity for work"*. (Kraepelin, 1921)loc.1119. Likewise, Goodwin and Jamison noted that: *"Even lay observers may recognize that bipolar disorder is at times accompanied by periods of euphoric mood, productivity, and high energy..."*(Goodwin and Jamison, 2007)p.xxi ; Mayer-Gross, Slater and Roth described a *"patient [who] rises early to a day of continuous and joyous activity."*(Mayer-Gross et al., 1969)p211.

A plausible example of this starts in 1200 following King John's departure from Westminster on 6 March 1200 [HIGH 1] and which lasted until his return there on 18 April. WL Warren, a modern historian, remarks that during these 60 or so days in England, King John heard 119 judicial pleas and *"even when crossing the Channel again he sent instructions to his justices or had them hold pleas until he returned"*.(Warren, 1978)p133. His opinion is based on research by Lady Stenton who also confirms this further, noting that *"not only were pleas heard before the king as he moved through the land during these months, but also that during this time the court at Westminster was practically in abeyance."*(Stenton, 1952)Vol1,p57. This study re-analysed the records of writs issued by the justices' court (total 72 over 6months) which Stenton had collated and published, in order to be able to compare their legal workload and its variability in the timeframe immediately before the period in question, with that of

King John.(see Table 26),(Stenton, 1952)Vol1,p30–32. This showed that on average each justice dealt with 3.4 writs/month during 1199 which compared to approximately 59 pleas/month heard by the king during March/April 1200 [HIGH1]. This disparity is amplified when the time required to the issue of a writ is considered: a writ is issued to summon defendants to court whereas pleas are the first court hearing when the defendant's plea is entered and this process occupies more court time. However, it does not preclude a comparable caseload.

**Table 26: Workload of the Justices' Court 1199**

Date	Number of Writs	Pattern of issue	Number of justices serving during that month
May 1199	5	x1 /day	3
June 1199	8	x1/ day except 30 June when x2 but by different justices	4
July 1199	41	Examples: <ul style="list-style-type: none"> <li>• 1 &amp; 8 July x2/day by same justice;</li> <li>• 19 &amp;20 July x3/day by same justice;</li> <li>• three justices working on 8 &amp; 11July</li> </ul>	5
Aug 1199	12	7,11 & 30 Aug x2/day by same justice	5
Sept 1199	5	x1/ day	3
Oct 1199	1	x1/ day	1
<b>Total</b>	<b>72</b>		<b>3.4 Writs/Justice/month</b>

However, the king's workload did not appear to stem from a backlog of cases given the tailing off of writs in September and October 1199 and that he heard 119 pleas where only 72 writs had been issued in the preceding 10 months (May 1199 – Feb 1200). Nor did it appear to be indicative of a new standard of legal provision given that "*there was no indication that the Justiciar intended to return immediately [to Westminster] on the king's departure [28 April 1200]*" having put back his remaining cases to 14 May. He was not the only one to absent himself from sitting after the king departed: his deputy, Hugh Bardulf also put back cases to the same date.(Stenton, 1952)Vol1,p87.

It would be reasonable to infer therefore that King John's volume of legal work was likely to be both unnecessary and excessive. Moreover, it is distinctly different in character and extent, when compared to his next visit to England during a low CPA period.

Further evidence of high legal activity can be determined from a re-analysis of the essoins during the following year 1201. (Essoins were the excuses sent to the court by defendants in lieu of their first appearance.) Stenton notes that "*The Justiciar [modern equivalent = Lord Chief Justice of England] had probably expected that the king would return to Normandy at the end of the year [1200] or early in 1201 at the latest. He had therefore planned to send Justices*

*out in eyre [circuit] in the beginning of 1201. By the middle of November it had become clear that the king had no intention of hurrying away...*"(Stenton, 1952)Vol1,p109. By 3 January 1201 [HIGH 4] King John was "*on his way to a perambulation of the north...*" accompanied by his queen, and later by Geoffrey fitzPeter, the Justiciar (6 Jan) and Simon of Pattishall (9 Jan), a justice of the bench.(Stenton, 1952)Vol1,p109,111,113.

King John diverted to Lincoln (12 Jan 1201; **HIGH 4**) to supervise the appointment a new bishop of Lincoln and although this process was not successful, Stenton notes that "*It was at Lincoln that entries began again to be made on the roll of proceedings coram rege [legal court].*"(Stenton, 1952)Vol1,p110. Evidence of this comes from the 3 *essoins* heard on 14 Jan 1201 [**HIGH 4**] and the 48 *essoins* a week later or as Stenton comments: "*Very much business was done before the king during these days...*"(Stenton, 1952)Vol1,p110. This included a hearing deferred from the previous autumn where the defendant had elected to have his case heard by the king and which reached agreement on Sunday 21 January. Likewise, two complicated and longstanding legal disputes, the first between William de Stuteville and William de Mowbray which dated back to 1106 after the battle of Tenchebrai and the second between the Abbot of Abingdon and Ralf Wigan (started in 1198, most recently deferred from 18 Nov 1200; **LOW 2**) were also heard before the king and settled. (Stenton, 1952)Vol1,pp110 – 112

Entries of cases continued all the way north and included 7 *essoins* on Sunday 11 February [HIGH 4] at Belford (TDH itinerary), although Stenton makes this location Mitford (55.168,-1.726) some thirty miles south and perhaps a daytime stopover *enroute* from Newcastle upon Tyne to Belford.(Stenton, 1952)Vol1,p113. This was the third Sunday that King John carried out legal administrative duties (the others being the Sundays 14 Jan and 21 Jan). King John's legal work continued as he travelling across the Pennines (modern A69) just south of Hadrian's wall despite the seasonal conditions to Carlisle (21st Feb), and continued as he travelled south along the Eden valley before re-crossing the Pennines (modern A66) and a southward progress via York and Nottingham to Burwell castle, Cambridgeshire.(Hardy, 1835a, Stenton, 1952)Vol1,pp115, 116. Stenton further notes that "*In contrast to the long list of essoins and pleas heard before the king... proceedings at Westminster were brief and lasted little more than a fortnight*" once more giving credence to the belief that the global legal workload was not excessive but unequally apportioned. (Stenton, 1952)Vol1,p116. In addition, Stenton suggests that there is evidence of hurry in the exercise of justice:

*hints of haste in the record of several pleas. If a suit cannot be settled at the first hearing it is automatically put to the coming of Justices. A number of people are put under sureties and one man is left in prison...*

(Stenton, 1952)Vol1,p121.

and which might amount to the "hasty and shallow judgement" alluded to by Kraepelin. (Kraepelin, 1921)loc.2441.

### **Comment**

Evidence of a heightened capacity for work is found from a re-analysis of King John's personal legal workload as published by Stenton and reanalysed by this study. However no contemporary writer makes any comment. This heightened capacity for work is associated with a CPA high period [HIGH4].

### **5.4.2 Anger**

The literature associates anger attacks with bipolar although these can be a feature of both mania and depression. (Novaco, 2010, Mammen et al., 2004, Perlis et al., 2004) Its recurrence during activity of the same polarity however, is indicative of diagnostic stability – where bipolar individuals repeatedly exhibit their own unique mix of symptoms during mania or depression.(Cassidy et al., 2001)

Although the term *ira* is used by many chroniclers and annals, Coggeshall provides the only datable evidence. The first occurred on 25 Mar 1200 [HIGH1] and describes a disproportionate response to the Cistercian Abbots that King John later revoked:

*Abbatēs vero illi , nondum communicato caeterorum coabbatum suorum consilio, et timentes, si regiae favissent exactioni, ordinem postmodum in serviles consuetudines redigi, simpliciter responderunt regi se nullatenus aliquam exactoriam praestare pecuniam, nisi communi consilio et assensu generalis capituli. Ex quorum responsione rex nimium exasperatus, **in ira et furore** praecepit vicecomitibus suis,( cum praesentibus agens verbo, et cum absentibus scripto,) ut viros ordinis illius quibuscumque valerent modis gravarent, ac molestias inferrent, ut de depressoribus ac calumniatoribus eorum nullam justitiam exhiberent, ne in aliquo negotio eis assisterent, sed totum ad regem referrent.*

(Stevenson, 1875) p102.

Truthfully, those abbots had not yet discussed [the matter] with the other abbots of their order, and feared that if they accepted the king's taxation, it would become "custom and practice" for the order, [so] they simply answered the king [by saying] that none of them could advance [such] monetary taxes without

discussion with their community and assent of the general chapter. From which response the king was **excessively irritated in anger and madness** directed his own men, (with verbal authorization to those present and written [authorisation] to those absent), so that the men of the [Cistercian] order should be thwarted in their endeavours and gain [nothing but] trouble and not one of them claim justice from suppression and slander, nor defence in business with anyone, but that they had to bring all [these matters] to the king [personally].

(my translation)

The second occurred on 12-17 Aug 1202 [**HIGH 6**] when Coggeshall not only says that the king's action was inappropriate but attributes it to a familial predisposition:

*Exacerbatus itaque indefessa congressione adversariorum, et minis eorum et impropiis lacessitus praecepit tandem **in ira et in furore tribus suis servientibus** quatinus ad Falesiam quantocius pergerent, atque hoc opus detestabile perpetrarent. Duo vero ex servientibus tam exercrabile opus in tam nobili adolescente committere detestantes, a curia domini regis diffugerunt; tertius vero ad castellum pervenit in quo puer regius a domino Huberto de Burch, regis camerario, diligenter custodiebatur, triplices annulos circa pedes habens.*

Stevenson p139, 140.

Aggravated by his unremitting adversaries and their threats, he took inappropriate action finally, enslaved **in the anger and madness of his family** [lit. tribe], ordering they should travel on as far as Falaise as soon as possible in order to carry out this abominable deed. Secondly indeed, they fled from the king's court from being embroiled (enslaved) and to avert committing so very accursed action on such a noble adolescent. Thirdly indeed, he came to the castle where Hubert de Burgh, a king's man, was carefully guarding the royal boy who had triple fetters around his feet.

(my translation)

Wendover describes four other occasions:

1. In 1207 Wendover records :

Ob hanc quoque causam idem rex in **furorem** versus et indignationem misit... ut monachos Canuarienses

(Coxe, 1841)p214.

[T]he said king in the fury of his **anger** and indignation sent. ... to expel the monks of Canterbury.

(Giles, 1849)p240.

2. In 1208 Wendover gives an account of the interaction between King John and the bishops sent by the Pope as a last ditch attempt to avoid the imposition of an interdict:

*Cumque iidem episcopi pro eius salute vellent protrahere sermonem, rex quasi in **furiam** versus contra dominum papam et eius cardinales in verba blasphemiae prorupit, jurans per dentes Dei, quod, si ipsi vel alii quicunque ausu temerario terras suas supponerent interdicto, ipse incontinenti universos Angliae praelatos, clericos*

*pariteret ordinatos, ad papam mitteret et bona eorum omnia confiscaret; addit etiam quod Romanos quos cumque, isve ipsius papae clericos, qui in regno Angliae sive in quibuscumque terris suis reperiri potuissent erutis oculis naribusque praecisis Romam destinaret, ut hiis intersignis a caeteris possent nationibus ibidem discerni;*

(Coxe, 1841)p221, 222.

*When the said bishops wishes, out of regard to the king, to prolong the discourse, the king became nearly **mad with rage**, and broke forth in word of blasphemy against the pope and his cardinals, swearing by God's teeth, that if they or any other priest soever presumptuously dared to lay his dominions under an interdict, he would immediately send all the prelates of England, clerks as well as ordained persons, to the pope, and confiscate all their property; he added moreover, that all the clark of Rome or of the pope himself who could be found in England or in his other territories, he would sent to Rome with their eyes plucked out, and their noses slit, that by these marks they might be known there from other people."*

(Giles, 1849)p245.

3. In 1212, in the context of those nobles "[W]hose fidelity to himself he had suspicions ...", Wendover states :

*Illi vero regiis jussionibus resistere non audentes remiserunt filios, nepotes et cognates suos ad libitum regis et sic **indignatio** eius aliquantulum conquievit;*

(Coxe, 1841)pp239, 240.

*The nobles not daring to disobey the king's command sent their sons nieces and other relatives at the pleasure of the king and thus his anger was in some small degree assuaged...*

(Giles, 1849)p258.

4. In 1215, Wendover notes:

*Duraverat autem obsidio tribus fere mensibus, unde rex , tum propter infinitam pecuniae summam quam in obsidione consumpserat, nimio **furore** succensus universos nobiles illos patibulo suspendi praecepit; sed vir nobilis Savaricus de Malo-leone .. Tunc rex, licet invitus, consilio eius et aliorum virorum prudentum adquiescens...*

(Coxe, 1841)p335.

*This siege had lasted almost three months and the king on account of the number of his troops slain as well as the money he had spent on the siege was greatly enraged and in his anger ordered all the nobles to be hung on the gibbet but the noble Savaric de Mauleon.... The king then, although unwillingly listened to his advice and that of other prudent men ...*

(Giles, 1849)p339.

The second events of 1208, of which Wendover uses the term "**furiam**", are reminiscent of those described by Coggeshall {HIGH1} in the list of disproportion punishments. It can be dated

as occurring between Christmas 1207 and before the imposition of the Interdict (23 Mar 08) during **HIGH 20**.

Of the others, the study took the view that the first (1207) was an expression of political displeasure directed against the Pope on receipt of his intentions, with the ensuing violence arising from the actions of his "*two most cruel and inhuman knights*".(Giles, 1849)p240. It has not been possible to date this event exactly: the Annals of Winchester suggest that it followed news of the consecration of Stephen Langton (sometime after 17 June 1207); the modern historian Knowles only alludes to it in his definitive paper on the Canterbury election.(Luard, 1865)pp78,79 If so, it might be related to the median band period (3 Jul –1 Oct 1207; 8.9MAS) Likewise the third example of undated royal displeasure is related to King John's suspicions of treachery in 1212 and is considered in more detail below (Section5.4.8: Suspiciousness). The last undated reference speaks of a king who intended to exercise royal displeasure by taking legally justifiable action against those who had defended Rochester against him, but who was open to reason and advice, albeit reluctantly. The siege was lifted on 6 Dec 1215 when King John changed from a low period associated with the siege to a high period (7 Dec 1215: 3.8MAS to 12.3MAS). These three examples demonstrate the difference between personal anger and royal displeasure.

### **Comment**

Two primary sources provide dateable accounts of disproportionate anger that were associated with equally disproportionate responses by the king. All occurred during high periods [**HIGH1,6,20**], and in one, the writer considered the King's anger to be inappropriate and associated with familial madness. Further evidence of poorer datable quality could be attributed to royal displeasure, of which one might be associated with a high period (7 Dec 1215 [**HIGH 32**] and another during a median band period (3Jul -1 Oct 1207; 8.9MAS). The third was associated with suspiciousness and is discussed below (see Section 5.4.8: Suspiciousness).

### **5.4.3 Homicide**

Public awareness and use of the term *homicidal mania* can be dated to the early twentieth century.(Eigen, 2010) Ballester and colleagues describe the "*greater rates of anger and aggressive behaviours, especially during acute and psychotic episodes*" even if Swann and

colleagues note that impulsivity is not associated with the severity of criminal behaviour.(Ballester et al., 2012, Swann et al., 2010) Yoon and colleagues (2012), in their 22 year study, showed that although homicide in mania is rare, the total rate of offending, ranging from battery to homicide, was greater during mania than depression (86.8% vs 13.2%). Victims were more likely to be family members than strangers (63.9% vs 36.1%). They noted that homicide in mania was driven by impulsivity and concurred with Swartz in recognising the aggravating influence of alcohol on violence during severe mental illness. (Yoon et al., 2012, Swartz et al., 1998) Cantanesi and colleagues have also shown that sharp weapons were most frequently associated with impulsive actions, in contradistinction to asphyxia (depression) or blunt trauma (organic disorders).(Catanesi et al., 2011)

Coggeshall records King John [HIGH 2] as "*transfretavit itaque spirans minarum et caedis in discipulos Christi*, "(Stevenson, 1875)p103. This translates as "*he crossed the sea therefore breathing threats and murder about the disciples of Christ*"( my translation). However this is a direct quotation from the Vulgate Bible citing Saul's actions (Acts of the Apostles Ch9v1: Saulus autem adhuc **spirans minarum et caedis in discipulos** Domini) and as such should probably be interpreted metaphorically.

Traditionally, King John stands accused of killing his nephew Arthur after lunch on Maundy Thursday ( 3 April 1203 [HIGH8] ) while "*drunk and possessed by the devil.*"(Warren, 1978)p83.:

*cum rex Johannes cepisset Arthurum, eumque aliquamdiu in carcere vivum tenuisset, in turre tandem Rothomagensi, feria quinta ante Pascha, post prandium **ebrius et daemonio plenus, propria manu interfecit**, et grandi lapide ad corpus eius alligato projecti in Secanam; quod reti piscatorio, id est, sagena, inventum est, et ad littus tractum, cognitum ; et in prioratu Becci, qui dicitur St Maries de Prato, occulte sepultum propter metum tyranni.*

(Luard, 1864)p27

Since King John had seized Arthur and had for some time held him alive in captivity finally in the tower of Rouen, [on] the fifth holiday before Easter after mealtime **like a drunk and full of demons, he killed [Arthur] with his own hands** and binding the body to a large stone threw him into the Seine; so that it was discovered with a fishing net, [to be exact] a drag net and when pulled ashore was recognised and buried secretly at the priory of Bec known as Notre Dame de Pres on account of fear of the tyrant.

my translation

At first sight, this appears to be a straightforward description of alcohol fuelled violence which in general circumstances would be explanation enough.(Murdoch and Ross, 1990) However the term *ebrius* can be translated *like a drunk* and *daemonio plenus* can be rendered as *full of demons*. As this was Holy Week, with its tradition of abstinence, this might suggest

that the origins of King John behaviour were not so much the result of alcohol but of acute mania (stage 3), where he behaved as if drunk and as if controlled by external forces (see Chapter 2, p26)

Further, although at risk of extrapolation, this raises the possibility of Delusional Misidentification syndrome (DMS: where delusional individuals fail to recognise those around them, or attribute false identities to them) which is a known risk factor for violent behaviour.(Atta et al., 2006, Pauw and Szulecka, 1988) Such a theory stems from the conundrum that King John is accused of killing Arthur despite having no other heir at that time, despite having already seen the political fallout from rumours of Arthur's death and despite having moved Arthur to Rouen for his safe keeping. Even more so, given King John's legal propensities - "*not a sensible man and [was] fond of legal quibbling*" – why do it personally? (Powicke, 1913)p133. According to Gerald Cambrensis, Geoffrey of Brittany, King John's late brother and Arthur's father, was a man:

*overflowing with words, soft as oil, possessed, by his syrupy and persuasive eloquence, of the power of dissolving the seeming indissoluble, able to corrupt two kingdoms with is tongue; of tireless endeavour, a hypocrite in everything, a deceiver and dissembler*

(Warren, 1973)p592.

Hoveden wasted fewer words by calling Geoffrey "*that son of iniquity*".(Riley, 1853)p25. If King John, exhibiting the florid symptoms of acute mania, misidentified Arthur for his father Geoffrey, perhaps triggered by a similarity of gesture or a turn of phrase, then Arthur's killing was in effect surrogate fratricide or delusional misidentification syndrome. And if so, was the tradition of Maundy money, which King John began in 1210, part of his spiritual reparation for this act?(Kellet, 1990) Equally speculatively, was the real reason King John hounded Matilda de Braose the length of Ireland because she spoke of his madness at this time, and was this something that both her husband and the Margam chroniclers were careful not to repeat? (Warren, 1978)p186.

### **Comment**

One primary source accuses King John of the murder of his nephew on Maundy Thursday while not being *compos mentis*. Traditionally, this loss of control has been ascribed to alcohol despite Holy Week being a period of abstinence. The event occurred during a CPA high period [HIGH8].

#### **5.4.4 Affect: appropriate and incongruent**

Mayer-Gross and colleagues (1960) describe *"the silent shedding of tears ... in an otherwise expressionless face"* as indicative of depression and showing the appropriate or congruent mood. (Mayer-Gross et al., 1969) However clinicians are equally aware of the incongruent mood or affect, as for example the "smiling depressive", a spectrum that extends from those who are "putting on a social face" to individuals with frank psychosis. (Labeaune, 2014, Jaffe, 2010) This is of clinical importance as some studies indicate that *"the presence of mood-incongruent psychotic symptoms in depressed patients was a predictor of a poorer outcome."* which Tohen and colleagues quantified in terms of a shorter remission (inter-period) time. (Keller et al., 2007, Tohen et al., 1992)

The Anonymous of Bethune describes King John's appropriate affect when the hearts of his drowned friends were returned for burial (18 May 1216 [**LOW21**]) (see Section 5.4.10: Bereavement. )

Equally, during between 20 Jun- 17 July 1203 [**HIGH 9**], Wendover describes John as

Rex Anglorum interea apud Rothomagnum morabatur cum regina imbellis, ita quod ad omnibus diceretur ipsum fore sortilegis vel maleficiis infatuatum; hilarem cunctis inter tot damna et opprobria exhibebat vultum ac si sibi nihil deperiisset.  
(Coxe, 1841)p172.

*The King of England was staying inactive at Rouen with his queen so that it was said that he was infatuated by sorcery or witchcraft; for, in the midst of all his losses and disgrace, **he showed a cheerful countenance to all, as though he had lost nothing.***

(Giles, 1849)p207.

It is perhaps noteworthy to find that this record of King John's incongruous mood occurred directly after the high period where he is alleged to have murdered his nephew, suggesting that the postulated psychotic element associated with the murder may have continued despite changes in polarity from **HIGH8** to **LOW6** to **HIGH 9** (see Section 5.4.3:Homicide.).

Powicke, commenting on this period hints that *"John was the most uxorious of men"* , before admitting that *"[i]t is indeed, difficult to understand the king's mind during this summer" ....Those who witnessed his levity could attribute it to nothing but sorcery. Yet, to this cause of John's inaction we should probably add the fact that he was awaiting papal, if not imperial, interference."* and concluding *"[I]t is evident that he was mentally diseased"*. (Powicke, 1913)pp 158 ,162-3.

### **Comment**

The evidence from primary sources describes King John's appropriate and incongruent affect on different occasions which one modern historian attributes to mental illness. An example of appropriate affect is associated with a CPA low period [**LOW 21**]; an example of incongruent affect is associated with CPA high period [**HIGH 9**].

### **5.4.5 Blame**

" [S]elf-justifying interpretations may be associated with low levels of depression, where self-derogatory interpretations are associated with high levels of depression."(Mirowsky and Ross, 1990). Circumstantial evidence of self-justification may be found in King John's letter of May 11 1202 [**LOW4**], when he accused King Philip of insolence and blamed him for open aggression, while stressing his own humility and moderation:

..[with] *what humility and moderation we bore ourselves before him [Philip], and what insolence they [our spokesmen] found in him [Philip] and how he openly acted against the terms of the peace which had been made and confirmed between us.*

(Hardy, 1835b) p10b.

### **Comment**

From King John's own words, he self-justifies during CPA **LOW4**.

### **5.4.6 Tearfulness**

Crying, in association with feelings of depression, can be physically evoked by stimulation of the subthalamic nucleus when "*mood, expression and thought present simultaneously... [when] triggered by a manipulation of brain tissue*". When the stimulation is removed, the feelings and crying likewise stop simultaneously showing their close neural integration. (Goodwin and Jamison, 2007)p313. This provides the physiological background for the classical description of depression: *the silent shedding of tears... in an otherwise expressionless face.*"(Mayer-Gross et al., 1969)

The main elements of the reconciliation between King John and the Cistercian Abbots are recorded by the Annals of Margam, the Barnwell Chronicler, Hoveden and Coggeshall. However, only Coggeshall notes that the king cried:

Cumque illi pariter conclamarent," Omnia ex animo remittimus" mox rex ad pedes eorum se humiliter prostravit **ac lachrymis faciem regavit.**  
(Stevenson, 1875)p109.

whenever they [the Cistercian Abbots] all exclaimed " We'll forget all about it" soon the king prostrated himself at their feet with humbleness and **tears wet his face**  
(my translation)

### **Comment**

King John wept in public [**LOW2**], and like others in the public eye and throughout history, this provoked contemporaneous comment. Yet this account appears to be missing from modern evaluations of King John.

### **5.4.7 Suspiciousness**

Excessive and unfounded suspiciousness or mistrust constitutes the basis of paranoia. Kraepelin considered paranoia "*in the narrowest sense...restricted in application to ... "true" or non-hallucinatory [forms]*" so fundamental to bipolar as to devote the later part of his 1921 treatise to their account.(Kraepelin, 1921) The modern view however has moderated and limits its clinical context to Clinical Stage 2.(Goodwin and Jamison, 2007)

Powicke notes King John's behaviour relating to the account of Isabella's rescue just 8 months previously, in January 1203 [**HIGH7**].(Powicke, 1913)p158,note191. Powicke bases this on the History of William Marshal and the lines 12648-56 but a wider reading gives additional information:

*The King was so dismayed  
that he could hardly be calmed down,  
and nobody was given a word about what his plans were  
for he trusted nobody ...  
he had nobody but enemies  
who, if only they could capture him  
would be exceedingly overjoyed  
and gladly do him mischief ....*

*when Sir Peter de Préaux,  
a worthy and handsome knight ...  
showed great courage in taking the Queen to Le Mans...  
.... the King was pleased  
and was very grateful to him  
and thanked him warmly.*

(Holden and Gregory, 2002) Lines 12633 - 42; 45,46, 48; 50 -52

This demonstrates a king who "*could hardly be calmed down*", who kept his plans secret from even his court and who appears to have been very relieved when his wife was rescued.

In August 1203 [HIGH 9], Powicke, drawing on primary evidence not used by this study, remarks that "*John's fury gradually gave way to fits of lethargy, interrupted by moods of suspicion, by which the fidelity of none, from the earl of Chester downwards, was untouched.*"(Powicke, 1913)p158. Likewise, a few months later in early October 1203 [HIGH9], Powicke notes that "*excitement and suspicion preyed upon him*".(Powicke, 1913)p166.

Later in 1212, Wendover notes King John's suspicions:

*Rex autem, cum talia audisset, perturbatus est valde et animo consternatus, atque, cum intellexisset magnates Angliae a sua esse fidelitate absolutos, majorem literis sibi destinatis fidem adhibuit; unde....veniensque misit nuntios ad magnates universos sibi de fidelitate suspectos, exigens obsides ad euis, ut probaret qui vellent et qui nollent eius obtemperare praeceptis.*

(Coxe, 1841)p239.

*The king was greatly alarmed on learning this, and as he knew that the English nobles were absolved from their allegiance to him, he put more faith in the truth of the letters; therefore... he sent messengers to all the nobles of whose fidelity to himself he had suspicions and demanded hostages from them that he might thus find out who were willing, and who unwilling, to obey him.*

(Giles, 1849)p258.

The letters referred to were from the King of Scotland and from King John's natural daughter, Joan married to Llywellyn of Wales who both warned him of premeditated treachery from his barons.(Giles, 1849)p257. The possibility of their collusion, given their temporal coincidence and similarity of content, does not seem to have been considered by King John. Wales was motivated to deflect King John's imminent military retaliation and the letters achieved this because King John disbanded his army and travelled from Nottingham to London. From the itinerary this places the event as occurring between 9 -20 Sept 1212 [HIGH21]. However, shortly afterwards, Scotland gave asylum to Eustace de Vesci, one of two possible baronial

ringleaders, while Robert Fitzwalter fled to France.(Giles, 1849)p258. This was therefore a clever play on King John's suspicions of treachery from his own nobles that were sufficiently widely known to have reached Wales and Scotland or, King John was correct to suspect his barons. Given subsequent events, the latter is probably more likely and King John's fears where therefore founded in fact rather than fantasy.

### **Comment**

Both primary sources and modern opinion have noted that King John exhibited suspiciousness. Of three possible examples, one showed that his fears were reasonable and two were associated with secrecy and agitation. All periods were associated with CPA high periods [**HIGH 7,9,21**]

### **5.4.8 Switching**

A characteristic of bipolar periods is that they exhibit switching.(Akiskal et al., 2005, Goodwin and Jamison, 2007, ICD-10, 2010)

Coggeshall records events following Arthur's capture and his subsequent imprisonment at Falaise (10,11 Aug 1202 [**HIGH6**]). Further context is provided in Appendix 9, Period 16.

*Hubertus autem regis camerarius, honestati et famae regiae deferre volens, et indemnitati regis prospiciens, puerum regium servavit illaesum, perpendens quod dominus rex super tali edicto statim peoniteret, ac semper postmodum haberet exosum qui ejus tam crudeli imperio obtemperare praesumpisset; **quod magis ex subitaneo furore quam ex perpendiculo aequitatis et justitiae emanare credidit.***

(Stevenson, 1875)p140.

Hubert, honoured and famed as carrying out the king's wishes and with wise judgement of the king, protected uninjured the royal lad having weighed up carefully that the king regretted immediately over such edicts and had previously hated those who might presume to obey such a very cruel command; because rather, he [Hubert] believed [such behaviour] came from **sudden madness that erupts out of [a background of] upright equity and justice.**

(my translation)

### **Comment**

A close observer and long term supporter Hubert de Burgh, described King John's behaviour as being of sudden onset, changeable and out of character. His comments relate to events that occurred during CPA period **HIGH 6**. The CPA methodology demonstrates the statistically

significant changes at the start or end of each period; the confidence interval provides a statistical indication of the likely window of change. Hubert however, is unequivocal that this process was sudden.

#### **5.4.9 Association with alcohol**

Raimo and Schuckit (1998) noted the interrelationship between alcoholism and bipolar disorder to show that "*alcoholics have a 3% risk for bipolar disorder compared to a 1% risk in the general population*" and the likelihood "*that the relationship between alcohol dependence and independent bipolar disorder is small, but real*".(Raimo and Schuckit, 1998) "*The highest prevalence of self-medication was seen in bipolar I patients (41%)*" with men "*twice as likely as women to engage in self-medication*".(Bolton et al., 2009). Goodwin and Jamison note that "*increased alcohol consumption is as or more common with hypomania, mania, and mixed or transitional states*".(Goodwin and Jamison, 2007)p229.

Wine was produced mainly by the monastic orders and imported into England with consumption limited to those of financial means.(Duby, 1961) It was carried in tuns – the largest type of wooden barrel – which each contained about 950l or the equivalent of 1,266 modern 75cl bottles.(Estreicher, 2006)p54. Research on yeasts suggest that the alcohol content was likely to have been similar to modern production.(Mortimer, 2000)

The provision of alcohol is a recognised part of kingship but King John appears to have a personal association with large volumes. The first example has already been noted in Section 5.2.5 with regard to inflated self esteem: "*ten tuns [of wine] which was consumed "on the hill of Porchester [9-14 May1201 [Low3]] in the king's departure ... and two in Southampton, and two at Fareham, and three at Brockenhurst, and three on the king's ship.*" (Stenton, 1937)pp xii, 84,123,124. While some of this was consumed in entertaining those who had mustered at Southampton, 3 tuns were reserved for the king's ship. Ships of this period ranged from small local vessels to trading cogs used by the early Hanseatic league.(Crabtree, 2001) All had open decks, were single masted and square rigged and so, when the wind was unfavourable, were propelled by rowing. The exact number of crew or passengers remains speculative but is likely to be in the order of several dozen of each.(Han, 2010) King John sailed from Portsmouth and the Annals of Burton note that they had good weather ("*prosperis gavisavis ventis*", or favourable winds (Luard, 1864)p208). The itinerary notes his next known location at Bonneville sur Touque in Calvados, some 2.7miles from the Normandy coast near Le Havre, and some 18 days

later. As it was against the direction of trade to bring wine to the continent, it might be assumed that the three tuns were for direct consumption rather than supply. And with the availability of the equivalent of 211 modern bottles/day, whether on board, or in port, it might even be argued that the episode merits the term "booze cruise".

Likewise, shortly after Bonneville sur Touque, King John was entertained in Paris by King Philip and again wine featured, even if the French noted that King John's "*companions preferred bad wine to the good.*"(Powicke, 1913)p145,(Gillingham, 2010)p32. Following these festivities, King John exhibits a low period of travelling that lasted until 29 Aug 1201 but of so little administration that they have high uncertainty.

The second example relates to 7 Oct 1203 when Powicke notes

*[f]or some mysterious reason he left Rouen on Oct 7 almost alone. After crossing the river by boat to Notre-Dame-du-Pré, he appears to have ridden in the day to Bonneville-sur Touque, an enormous distance even for him. Two days later he celebrated the feast of Saint Denis at Caen, with much drinking of wine.*

(Powicke, 1913)p166.

Further details of this episode are presented in Appendix 9: Period 23.

### **Comment**

Secondary analysis and modern opinion both note the association of excessive volumes of alcohol and King John. The two examples are associated with CPA LOW3 and HIGH9.

#### **5.4.10 Association with life events e.g. bereavement**

*By definition, "[g]rief is the psychological and emotional reaction to a significant loss, not limited to death" and "[c]omplicated grief, previously referred to as traumatic grief, is typically not diagnosed until at least 6 months have passed after the loss."*(Hensley and Clayton, 2008)

Although complicated grief is associated with "*a substantial burden of co-morbid grief related illness and impairment in patients with bipolar disorder* ", grief itself has also been associated with suicide in bipolar patients.(Simon et al., 2005)

There are two accounts of circumstances associated with bereavement experienced by King John. The first concerns the burial of St Hugh of Lincoln (16 Nov 1200[LOW2]) where King John was one of the bearer party, an action sufficiently unusual that it has been attributed to

be a marker of his personal loss.(Warren, 1978)p70,(Coxe, 1841)p155-165. However, the CPA period began some seven weeks prior to the funeral and lasted a further seven weeks. One week after St Hugh's funeral, King John was being bled, evidence that his physicians were active during this time because the king was unwell.

The second relates to the loss of some of King John's loyal courtiers at sea during a storm, in a naval venture as they blockaded Calais. The Anonymous of Bethune records King John's response to the return of their hearts for burial (18 May 1216[**LOW21**]):

*cel jour meisnes arriva primes li cuens de Naviers et li cuens de Hollande et Mikius de Harnes et Hues Havès et Guis de la Roches et Robiers Biertaus et bien 2 chevalier.*

*Lors pierdi moult li rois Jehans le cuer; il cevaucha une piece sour le rivage avant et arriere, si fist sonner ses tromper; mais poi esbaudi ses gens, et poi les conforta [, moult fu de povre samblant]. Quant il ot là une pieche esté, il se parti d'eus ausi comme à emblée, si s'en ala grant aleure viers Douvre. Bien fu une liue loing ançis que li plus ses gens en seuussent mot. Robiers de Biethune et Baudiun d'Aire [?Aumale] et Gillebiers ses oncles et Gautiers Biertiaus, quant il sorent que li roise enestoit alés, moult lor desplot; il n'oserent là demourer, ains s'en alerent apriès lui tout plourant, car moult estoient dolant et irié; à Douvre le trouverent moult desconforté.*

(Michel, 1840)p169.

this day the missing arrived at first light [Canonical Hour: Prime, about 7am] - the hearts of the sailors, of de Hollande and Michael of Harnes and Hugh Haves and Guys de la Roches and Robert Biertaus and two good soldiers.

Then King John's [own] heart crumbled into many pieces; for a time he rode to and fro along the coast before he gave the order to sound the trumpets; but this hardly emboldened his men and hardly encouraged them (many seemed the poorer for it.) Sometime after, he slipped away from the others, so that he covered a great distance towards Dover. He was a good league (old style) distant before most of his men heard the news. Robert of Bethune, and Baldwin of Aumale and Gilbert his uncles, and Walter Berthaus, when they found that the king was gone, were also much distressed. They didn't dare remain there, rather they went after him all mourning, with their tears and anger much restrained. They found him at Dover very troubled.

(my translation)

The associated CPA period starts three weeks prior to these events. Three days later (21 May 1216), CPA identifies a 22 day high period ([**high34**] before returning to low activity [**LOW22**] for the subsequent 28 days, when King John stayed mainly at Corfe castle.

## **Comment**

Two primary sources describe the king's response to bereavement during two low CPA periods [LOW 2 &21]. During LOW2, physicians were in attendance and the modern historian Warren suggests that the king exhibited unusual behaviour.

## **5.5 Chapter 5: Summary**

A summary of this investigation is presented in Table 27 which describes the identity of 19 individual symptoms, the quality of the evidence and their polarity as identified by CPA. Considering the sources – their survival over 800 year and their non-medical authorship – it is perhaps surprising to find so much primary evidence, and so much that is associated with the appropriate diagnostic polarity. Their concurrence adds credence to the diagnosis of bipolar disorder, as diagnostic symptoms are no more likely to be found in compliant CPA periods, unless as evidence of bipolar disorder. Equally, each symptom is only associated with one polarity which is not only a marker of diagnostic stability but highly unlikely to occur by chance.

Despite this weight of evidence, the study acknowledges the tenuous nature of evidence for some individual symptoms, even if together they might be greater than the sum of their parts. This burden of consistent evidence goes against Warren's summary dismissal of the likelihood of bipolar disorder as "*merely to put a medical term on tainted testimony*"(Warren, 1978)p88.

The study therefore considers the second null hypothesis

***There is no historical corroborative evidence of bipolar disorder symptomatology associated with medically compliant periods of significant change in King John's travelling activity.***

and in view of the 19 symptoms identified, rejects that statement to say that

***there is historical corroborative evidence of bipolar disorder symptomatology associated with periods of significant change in King John's travelling activity.***

**Table 27: Comparison of Symptoms with CPA periods and predominant polarity.**

Symptoms		Evidence			Predominant CPA period type
		Dateable Primary Source	Secondary Analysis	Historical Opinion	
<b>Mania ( ICD-10)</b>					
5.2.1	Increased activity pr physical restlessness			✓	HIGH
5.2.2	Decreased need for sleep	✓			HIGH
5.2.3	Increased sexual energy or sexual indiscretions	✓		✓	HIGH
5.2.4	Foolhardy or reckless behaviour whose risks the individual does not recognize	✓		✓	HIGH
5.2.5	Inflated Self Esteem and Grandiosity	✓		✓	HIGH
5.2.6	Increased talkativeness	NO EVIDENCE FOUND			
	Flight of ideas or thoughts racing				
	Difficulty in concentration or distractibility; constant changes in activity or plans				
Loss of normal social inhibitions resulting in inappropriate behaviour					
<b>Depression ( ICD-10)</b>					
5.3.1	Increased fatiguability	✓		✓	LOW
5.3.2	Diminished ability to think or concentrate	✓			LOW
5.3.3	Change in psychomotor activity (low)	✓	✓	✓	LOW
5.3.4	Change in circadian rhythm	✓			LOW
5.3.5	Loss of interest or pleasure	NO EVIDENCE FOUND			
	Loss of confidence or self esteem				
	Unreasonable self reproach or excessive guilt				
	Recurrent thoughts of death or suicide/suicidal behaviour				
	Change in appetite with weight change				
<b>Symptom described in literature</b>					
5.4.1	Heightened capacity for work		✓		HIGH
5.4.2	Anger	✓			HIGH
5.4.3	Homicide	✓		✓	HIGH
5.4.4	Affect: incongruent	✓		✓	HIGH
5.4.5	Blame	✓			LOW
5.4.6	Tearfulness	✓			LOW
5.4.7	Suspiciousness	✓		✓	HIGH
5.4.8	Switching	✓			HIGH
5.4.9	Association with alcohol		✓	✓	HIGH & LOW
5.4.10	Association with bereavement	✓		✓	LOW

## ***Chapter 6: Historical Evaluation using CPA***

This chapter describes how Change Point Analysis might be used as a tool to evaluate circumstantial evidence in historical research. It examined a section of King John's reign through the lens of a sample of sources in order to seek evidence against the third null hypothesis:

### ***Null Hypothesis 3***

***There is no historical corroborative circumstantial evidence of bipolar disorder associated with periods of significant change in King John's travelling activity.***

This included all periods identified by CPA during this time i.e. both ICD-10 compliant and non-compliant.

### ***Method***

Twenty contemporary textual sources were explored and handled in a comparable manner to the methodology in Chapter 5. (Richard Devizes' account was not included as it did not provide any evidence for this period.) As before, textual comments were sought first, irrespective of their relationship to any CPA period, and then placed in CPA period context.

The period Yrs 1200 – 1203 was chosen because of the additional contributions from chroniclers such as Roger de Hoveden and Ralph Diceto. It was also analysed to ensure that it was a representative selection of King John's reign. (see Figure 52)

The information was presented sequentially in the following format, using maps generated by Google My Maps™:

1. map of the period journeys
2. written description of the travelling route
3. evidence from primary sources
4. Comment considering
  - a) circumstances
  - b) acts of commission
  - c) acts of omission
  - d) behaviour that is difficult to explain
5. Evaluation

## Results

### 6.1 Sources

Over the four year sample period, 129 accounts of events were found, although often they contained duplicate information (see Table 28). Wendover, Coggeshall and the Annals of Bury St Edmund provided accounts that were often accompanied by dates, most commonly recorded as religious feast days.

**Table 28: Sources and sequentially numbered periods**

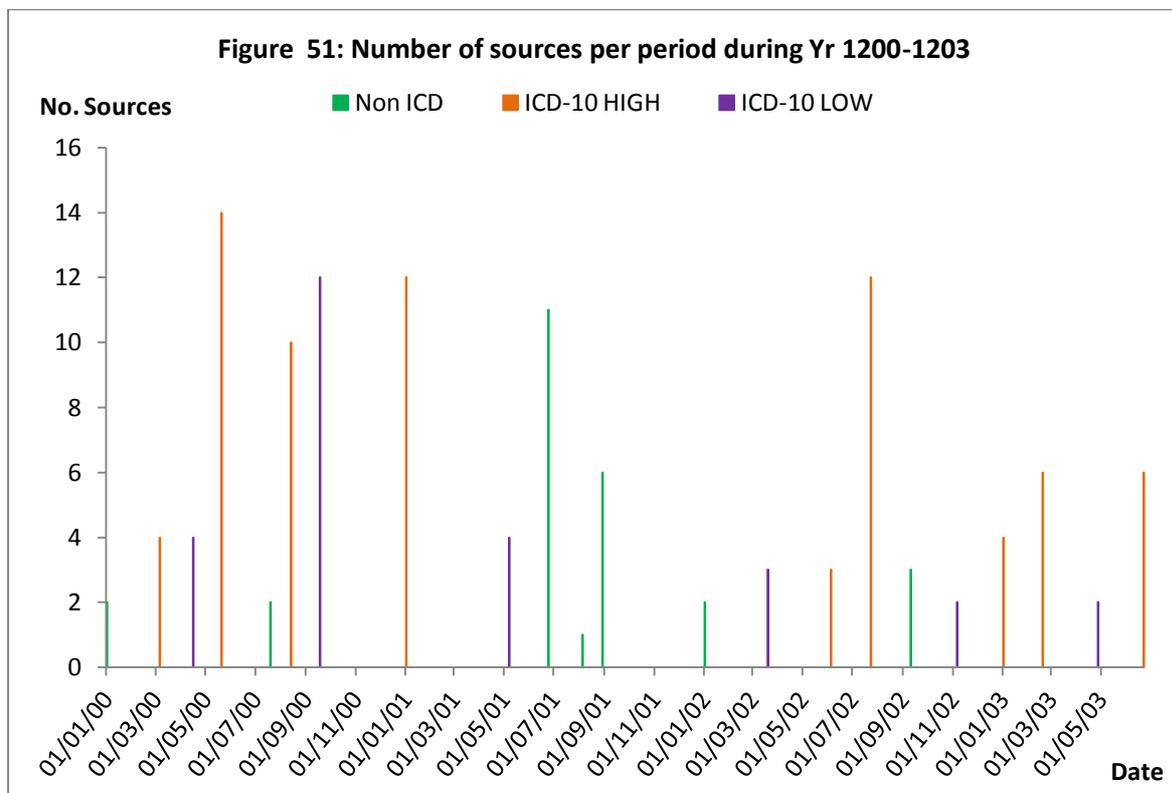
Source	CPA SEQUENTIAL PERIOD																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Barnwell		1	1	1		1	1	1	1	1	1													
Coggeshall				1			1	1					1		1	1	1					1	1	
Wendover	1			1			1	1	1	1			1		1		1	1	1			1	1	1
Gervase			1	1				1				1	1		1	1								
William le Breton																						1		
Roger de Hoveden		1	1	1		1	1	1		1														
Ralph Diceto				1		1	1	1	1				1		1									
Histoire de Duc de Normandie				1						1		1					1							1
Annales Bermondsey				1																				
Annales Dunstable				1		1	1																	
Annales Bury St Edmunds		1	1		1	1	1	1	1	1		1		1	1	1		1				1	1	
Annales Chester		1						1									1							1
Annales Burton (upon Trent)				1	1	1	1	1	1	1		1				1								
Annales Tewkesbury				1				1																
Annales Margam				1			1	1								1			1			1		
Annales Osney				1		1	1					1				1						1		
Annales Worcester				1		1	1	1						1		1								1
Annales Waverley						1	1									1			1				1	
Annales Winchester	1					1	1	1								1			1					
Annales St Aubin etc				1						1						1	1		1			1		
<b>TOTAL</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>14</b>	<b>2</b>	<b>10</b>	<b>13</b>	<b>13</b>	<b>5</b>	<b>9</b>	<b>1</b>	<b>7</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>12</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>7</b>	<b>2</b>	<b>6</b>	

### Analysis of Source Sample

Statistics comparing the number of sources underpinning each of the three types of period are presented in Table 29, and their distribution over time in Figure 51. This demonstrated a similar median between the low and non-compliant periods (2 compared to 3.5) suggesting that the number of sources that underpin the non-compliant periods were not significantly different from those for low ICD-10 periods. Such a similar or comparable evidence base gave confidence in the validity of any subsequent comparative evaluation. Both low and non-compliant periods however were different from high ICD-10 periods, which has approximately double the median value (6). This suggests that more activity gave rise to more comment, perhaps as different writers considered the same news worthy of record. This pattern is also similar to that seen in King John's legal activity (see Section 4.3.3).

**Table 29: Statistics of Sources per CPA periods 1-23 (1200-1203) by High/Low/non-ICD**

Non ICD	n=8	ICD-10 HIGH	n=9	ICD-10 LOW	n=6
Mean	3.375	Mean	7.888888889	Mean	4.5
Standard Error	1.25267571	Standard Error	1.378852627	Standard Error	1.543804824
Median	2	Median	6	Median	3.5
Mode	2	Mode	4	Mode	4
Standard Deviation	3.54310195	Standard Deviation	4.136557882	Standard Deviation	3.78153408
Sample Variance	12.5535714	Sample Variance	17.11111111	Sample Variance	14.3
Kurtosis	2.93241119	Kurtosis	-1.7902742	Kurtosis	4.866252628
Skewness	1.72033035	Skewness	0.292092137	Skewness	2.146980814
Range	11	Range	11	Range	10
Minimum	0	Minimum	3	Minimum	2
Maximum	11	Maximum	14	Maximum	12
Sum	27	Sum	71	Sum	27
Count	8	Count	9	Count	6
Confidence Level(95.0%)	2.96210736	Confidence Level(95.0%)	3.179639858	Confidence Level(95.0%)	3.968476636



Graph of number of sources commenting on each period ( y-axis) during the sample timeframe(Yr1200-1203) (x-axis) showing the general similarity between the number of non-ICD and low period sources compared to the greater number associated with high period.

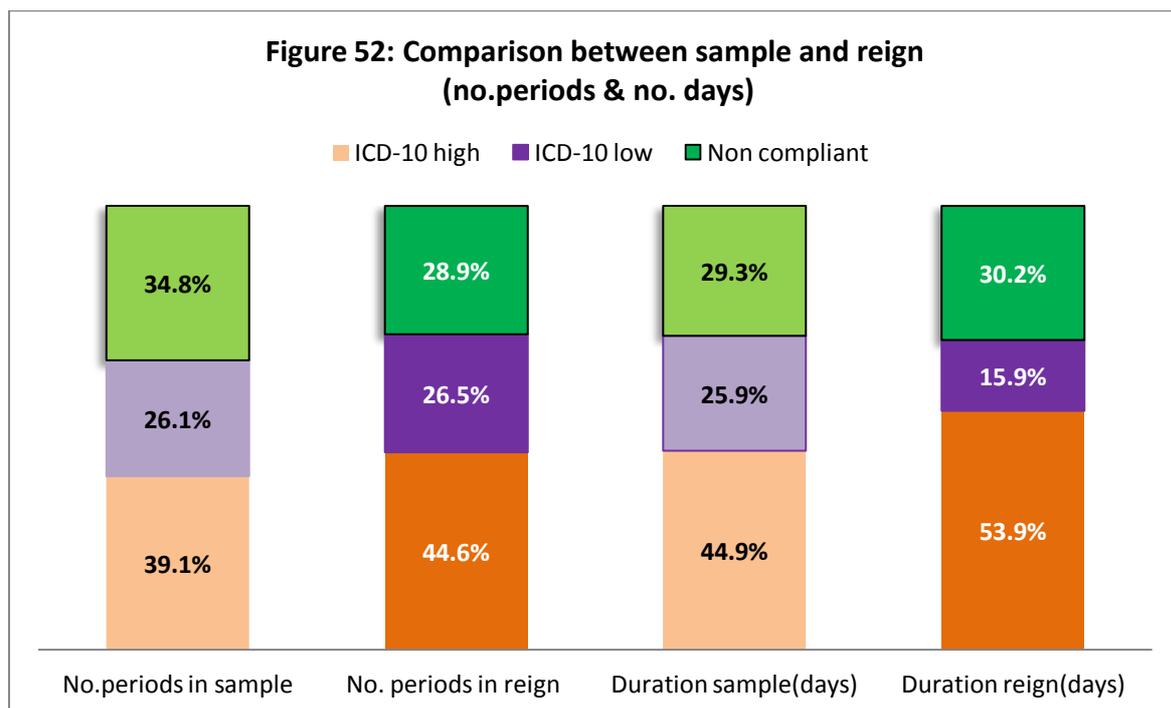
## Comparative Analysis

The CPA periods identified during Years 1200 to 1203 can thus be categorized as:

- 9 ICD-10 compliant high periods
- 6 ICD-10 compliant low periods
- 8 non-compliant periods of which
  - 7 high uncertainty ;1 non-compliant (low period of 13days)
  - 5 low and 3 high periods;

The sample data was compared to that for the whole reign using the number of periods and their duration. The greatest disparity was found in the high periods, both in number and duration; a better match was found in the number of low periods but not in their duration, and the reverse finding in non-compliant periods i.e. good match in duration but less so in period number .

Overall the CPA periods and days in the sample were seen to be a reasonable match of those found in the whole reign, as were the percentage number of days. This provided statistical justification that the samples were representative.



*Percentage stacks comparing the percentage number of periods (ICDHigh, ICDLow and ICD non compliant) in sample versus reign (1st and 2nd stacks) and similarly, the percentage duration (3rd and 4 stacks).*

## 6.2 Analysis of Events 1200-1203

The events of 23 sequential CPA periods were investigated and the information collated. This found 10 periods that contained circumstantial evidence consistent with bipolar behaviour.

The results are collated below (Table 30) and periods 1-8 presented sequentially with the remainder in Appendix 9 so as not to exceed the submission word count.

**Table 30: Results of Sequential CPA periods (1200-1203)**

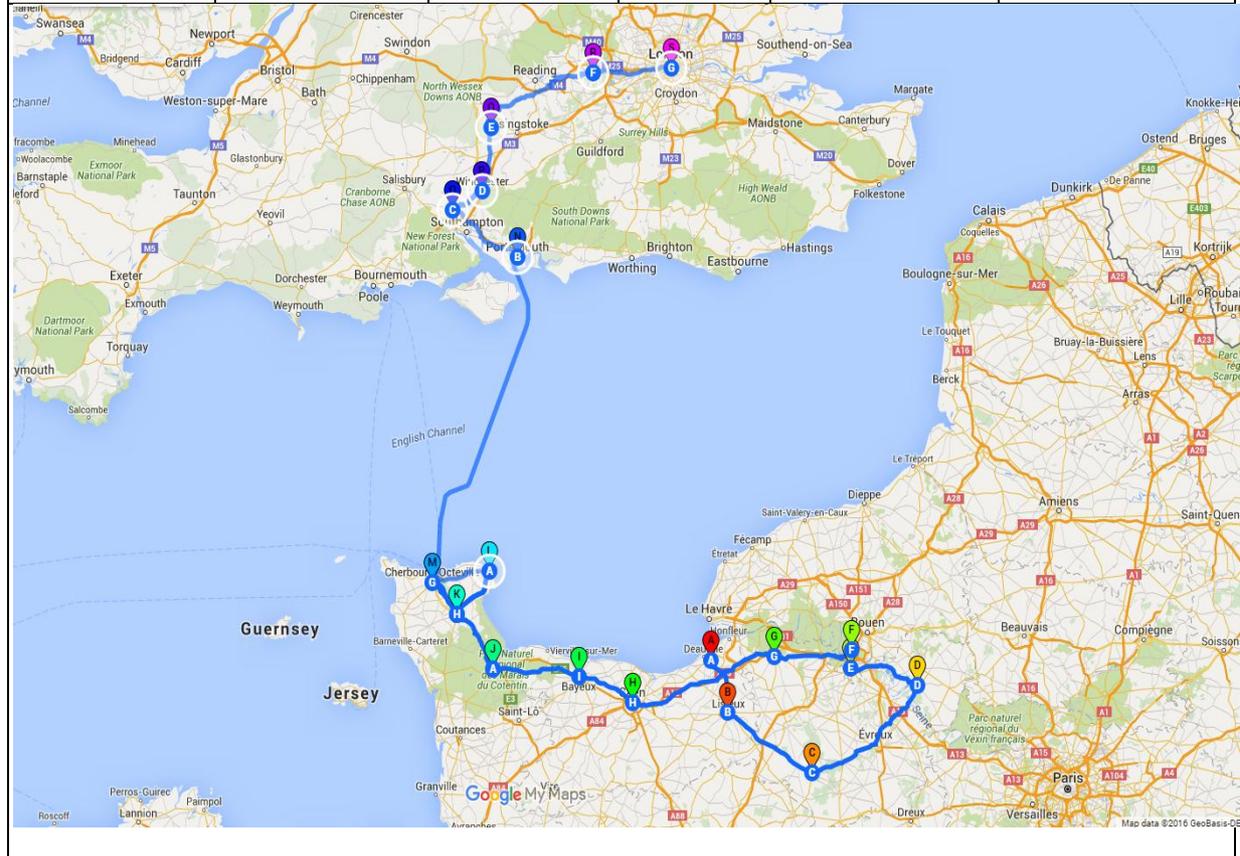
Sequential Number [CPA PERIOD]	Date from	Date to	MAS	Duration (days)	% Uncertainty	Possible Bipolar Behaviour
1	01/01/00	06/03/00	6.26	66	39.39	
2 [HIGH1]	06/03/00	15/04/00	12.5	41	29.27	✓
3 [LOW1]	15/04/00	20/05/00	6.5	36	25.00	
4 [HIGH2]	20/05/00	19/07/00	12.8	61	29.50	
5	19/07/00	13/08/00	6.45	26	76.92	
6 [HIGH3]	13/08/00	17/09/00	12.4	36	30.60	✓
7 [LOW2]	17/09/00	31/12/00	6.8	106	25.47	✓
8 [HIGH4]	01/01/01	07/05/01	9.8	127	29.13	✓
9 [LOW3]	07/05/01	24/06/01	3	49	32.65	
10	24/06/01	05/08/01	6.97	43	67.44	
11	05/08/01	29/08/01	1.04	25	92.00	
12	29/08/01	31/12/01	9.93	125	48.80	✓
13	01/01/02	19/03/02	10.86	78	37.18	
14 [LOW4]	19/03/02	04/06/02	6.2	78	32.05	
15 [HIGH5]	04/06/02	23/07/02	9.23	50	48.00	
16 [HIGH6]	23/07/02	10/09/02	17.6	50	14.00	✓
17	10/09/02	05/11/02	9.07	57	45.61	
18 [LOW5]	05/11/02	31/12/02	6	57	15.79	✓
19 [HIGH7]	01/01/03	06/02/03	10.1	37	13.51	
20	06/02/03	18/02/03	4.5	13	0.00	
21 [HIGH8]	18/02/03	27/04/03	11.5	69	13.04	✓
22 [LOW6]	27/04/03	22/06/03	5.8	57	12.28	✓
23 [HIGH9]	22/06/03	31/12/03	12.2	193	17.10	✓

## Analysis of 23 Sequential Periods (1200-1203): Periods 1-8

(See Appendix 9 for Sequential Periods 9 –23)

### Period 1

Period Number	Date from	Date to	MAS	Duration (days)	% Uncertainty
1	01/01/00	06/03/00	6.26	66	39.39



### 2. Travelling

From Caen ( Christmas 1199) King John travelled directly to Bonneville sur Touques (5 Jan 1200, marked RED A) before turning south and following the La Touque upriver to Lisieux (7 Jan), then upriver following its eastern tributary, river l'Orbiquet to Orbec (assumed), over the watershed via Chamblac (assumed) and on to Lire (8 Jan) in the Risle valley. Over the next three days King John headed northeast towards Andelys. He traversed three river valley systems with the most direct route crossing the watershed to Conches en Ouche (assumed) and followed the Le Rouloir and then the l'Iton tributaries downriver to Evreux ( assumed); crossing the watershed into the Eure valley, and lastly crossing the watershed into the Seine valley to reach Andelys ( Chateau Gaillard) (11Jan).

From Andelys, he followed the Seine via Orival (14/15 Jan) to St Vaubourg (16 Jan) when he headed due west across the watershed to the Risle valley and Pont Audemer (19 Jan) and along the

coastal road (ancient, possibly Roman) across three watersheds: firstly La Touques valley, then the marshy Auges valley, before reaching Caen (24-28Jan) on the river Orne. He continued westward parallel to the coast via Bures (29/30th Jan) and Carentan (30/31 Jan) to Valognes (1 Feb) on the Cotentin Peninsula. From 1st – 24th Feb, he is moved north, around the small triangle demarcated by Valognes, Barfleur and Cherbourg, before crossing the Channel to Portsmouth (27 Feb).

From Portsmouth, he travelled northwest to Romsey (28Feb) before turning northeast via Winchester (1 Mar), Freemantle (2 Mar) and Windsor (3/4Mar) to Westminster (6 Mar). This ignored the most direct and ancient route from Winchester to London, which follows the valleys of the Rivers Itchen and Wey, via Arlesford, Alton, Farnham and Guildford (St Swinthin's Way).

### **3. Primary Sources**

Of the 20 sources investigated, 2 made comments on this period. **Wendover** says that after the feast of St Hiliary (14 Jan) the two kings met between Gaillon and Butavant. However from the itinerary this is more likely to have been before the feast day when King John was based at Andelys (11-14 Jan).

The **Annals of Winchester** note the King's arrival on Feb 25 at Portsmouth which is entirely feasible, by assuming that he remained there until 27Feb (itinerary). The Annals continues: "*In mense Martio factum est talliagium per total Angliam de qualibet carruca 3 solidos (In March a tax of 3s per carucate anywhere was imposed on the whole of England.)*. A carucate was a term used to measure arable land (approx 120 acres) and was derived from Danelaw. Given its timing, it is likely that this taxation was in response to the negotiations between the two kings and indicative of the likely terms of any future agreement.

### **4. Comment**

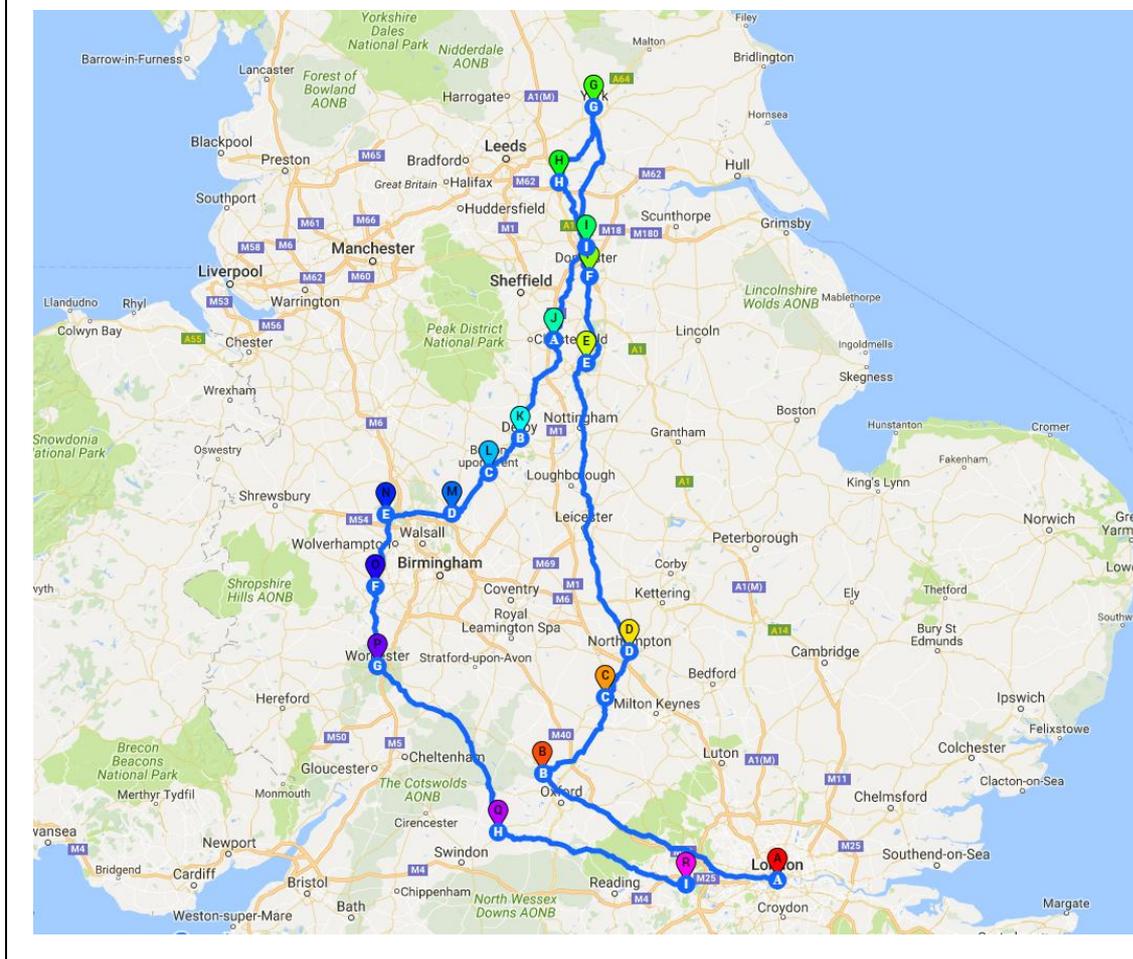
This is a period of low travelling activity (6.26MAS) that lasted 66 days, with an uncertainty of 39.4%. There are no records of any acts of commission or omission, nor any behaviour that is difficult to explain from circumstances. During these two and a half months, King John exhibited a steady low pace of travelling (6.26MAS) through Normandy and England. He waited three weeks for good sailing conditions although showed some restlessness by continually moving between Valognes, Barfleur and Cherbourg. The imposition of a general taxation, if made in advance of the formal negotiations with France, could be deemed to show political anticipation.

### **5. Evaluation period 1**

Although CPA has identified a low period of activity, there is no arguable evidence for bipolar behaviour during this period and it is likely to have resulted from external circumstances.

## Period 2

Period Number	Date from	Date to	MAS	Duration (days)	% Uncertainty
2 [HIGH1]	06/03/00	15/04/00	12.5	41	29.27



### 2. Travelling

This period starts at Westminster (6, 8 Mar1200) from where King John travelled to Northampton (16Mar); Clipstone (19 Mar); Tickhill 20 –22Mar) to York 25 Mar-28Mar). He then returned south via Brotherton (28 Mar) ; Doncaster (28 Mar); Derby 31Mar); Burton upon Trent(31 Mar,1 Apr) to Lichfield (2,3 Apr). The king then travelled west to Brewood (4 Apr) before turning south again via Kinfare (5 Apr) to Worcester (6 – 11April) where he remained for at least six days. From there he crossed the Cotswolds to Farringdon (13 Apr) before reaching Windsor (16,17 Apr).

### 3. Primary Sources

Of the 20 sources investigated, 5 made comments on this period. **Hoveden** and the **Barnwell Chronicler** records that King John crossed the Channel from Normandy, imposed a tax of 3s on the whole of England, in Lent travelled to York to meet the King of Scotland who did not come, and

celebrated Easter at Worcester (9 Apr). (Riley, 1853)pp472,480, (Stubbs, 1873)pp158,159. The **Annals of Bury St Edmunds** confirms the taxation rate adding that the religious orders were exempt, although the **Annals of Chester** gives the rate as " duo denaria" (two pence) per carcate.(Arnold, 1892)p7,(Christie, 1887)p46

**Coggeshall** gives account of the dispute that arose between the Cistercian Abbots and the king at York over the terms of his recent taxation to raise funds.(see Section 5.4.2) It would appear that it started with a verbal request by the King for payment from the Abbots who, not having had the opportunity of debating it amongst themselves, and wishing to avoid a precedent against future taxation, simply said they didn't keep that sort of money unless with the assent of their General Chapter. This "*nimum exasperatus*" (excessively exasperated) the king who "*in ira et furore*" (in anger and madness/passion) ordered his henchmen to increase their burdens, bring on troubles, overwhelm them with false accusations without the means of redress through justice, nor to assist them in their business, but refer everything to the king. And that these orders were to be distributed verbally and in writing.(Stevenson, 1875)p101 The Abbots appealed for help from the Archbishop of Canterbury, seeking to mitigate the royal sentence.(Stevenson, 1875)p102. Coggeshall says that in time (*ad tempus*), the king was persuaded to revoke the orders and issue new ones but "*non tamen animositatem suam erga eos mens efferata deposuit.*"(lit. not yet his wrath against them the wild mind has given up.).

#### **4. Comment**

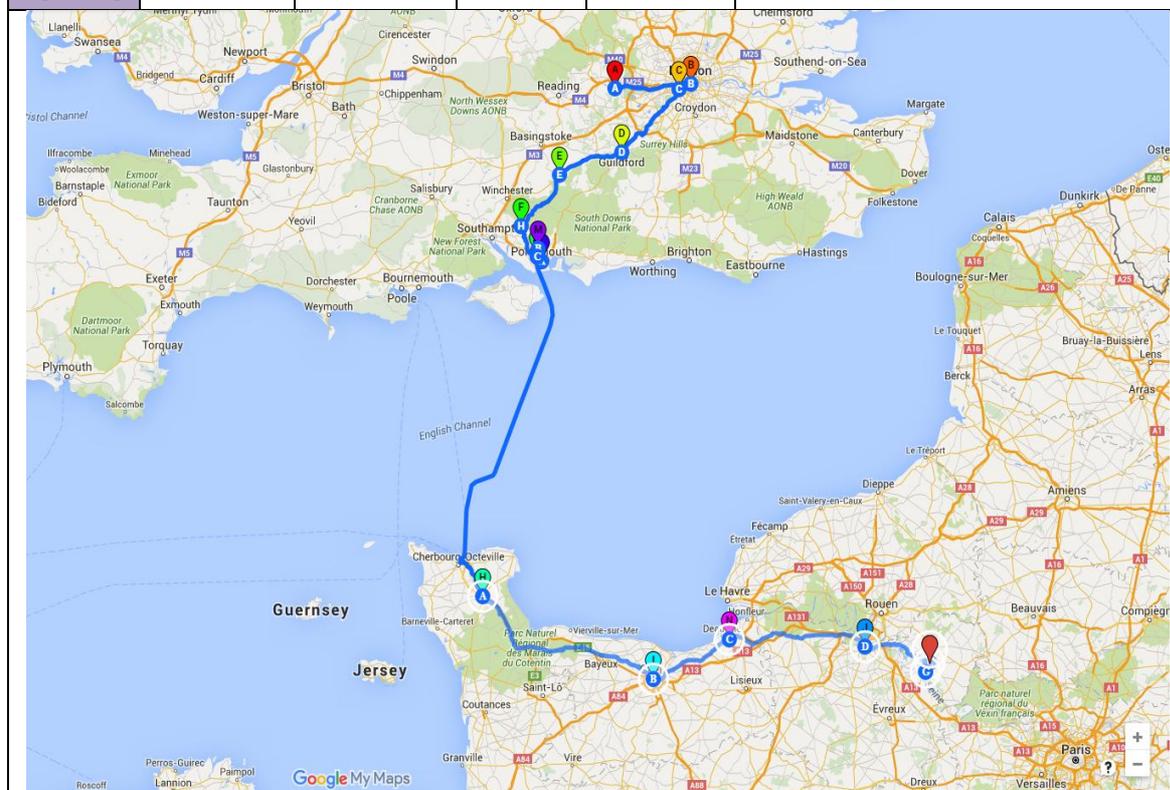
This is a period of high travelling activity (12.5MAS) that lasted 41 days, with an acceptable uncertainty of 29%. There are no records of any acts of commission or omission. However, the account of his interaction with the Cistercian Abbots, with its emotional intensity and lack of proportionality is behaviour that is difficult to explain from the circumstances. The Archbishop of Canterbury clearly considered the matter of sufficient injustice to risk championing their cause. Moreover, it stands in sharp contrast to the circumstances of his next meeting with them (Period 7[Low2]).

#### **5. Evaluation period 2**

CPA has identified a high period of activity where there is arguable evidence for bipolar behaviour during this period, namely the interaction between the King and the Cistercian Abbots .

### Period 3

Period Number	Date from	Date to	MAS	Duration (days)	% Uncertainty
3[Low1]	15/04/00	20/05/00	6.5	36	25.00



### 2. Travelling

The period starts at Windsor (16, 17 April 1200) and is followed by a 3 day stay at Westminster (18 – 20 Apr) before King John travelled via Fulham (21 Apr); Guildford (22, 23 Apr); Alton (23 Apr); Bishops Waltham (24 Apr) to Portchester (24 – 28 Apr). While presumably waiting for good sailing conditions or the readiness of his craft, he undertook several day trips from Portchester to Bishops Waltham (25 Apr); Portsmouth (26 Apr) and Southwick (27 Apr). King John crossed the Channel sometime during the period 29 April to 1 May landing at Valognes (2 May) on the Continent Peninsula.

From there he travelled eastward via Caen (5 May); Bonneville sur Touque (7 May) to Orival (9 May) and then upriver along the Seine valley to Andelys (11, 12 May). On 16 May the king was at Gaillon/Butavant before returning to Andelys (17 – 25 May).

### 3. Primary Sources

Of the 20 sources investigated, 4 made comments on this period. Both the **Barnwell Chronicler** and **Hoveden** note King John's transfer across the Channel prior to meeting the French king on 2

July.(Stubbs, 1873)p158,159,(Riley, 1853)p480. According to **Gervase**, this occurred against the backdrop of their truce that expired on 24 June.(Stubbs, 1880)p92. **Coggeshall**, continuing his story of the row between the king and the Cistercian Abbots, writes that the king, "[t]*ransfretavit itaque spirans minarum et caedis in discipulos Christi, abbatibus transmarinis conquerens de responsione abbatum in Anglia degentium*" (he crossed [the Channel] *breathing murderous threats against the Lord's disciples [Acts 9v1]*), the Abbots on the continent bewailing the delay in refuting the Abbots in England ( my translation)) (Stevenson, 1875)p103.

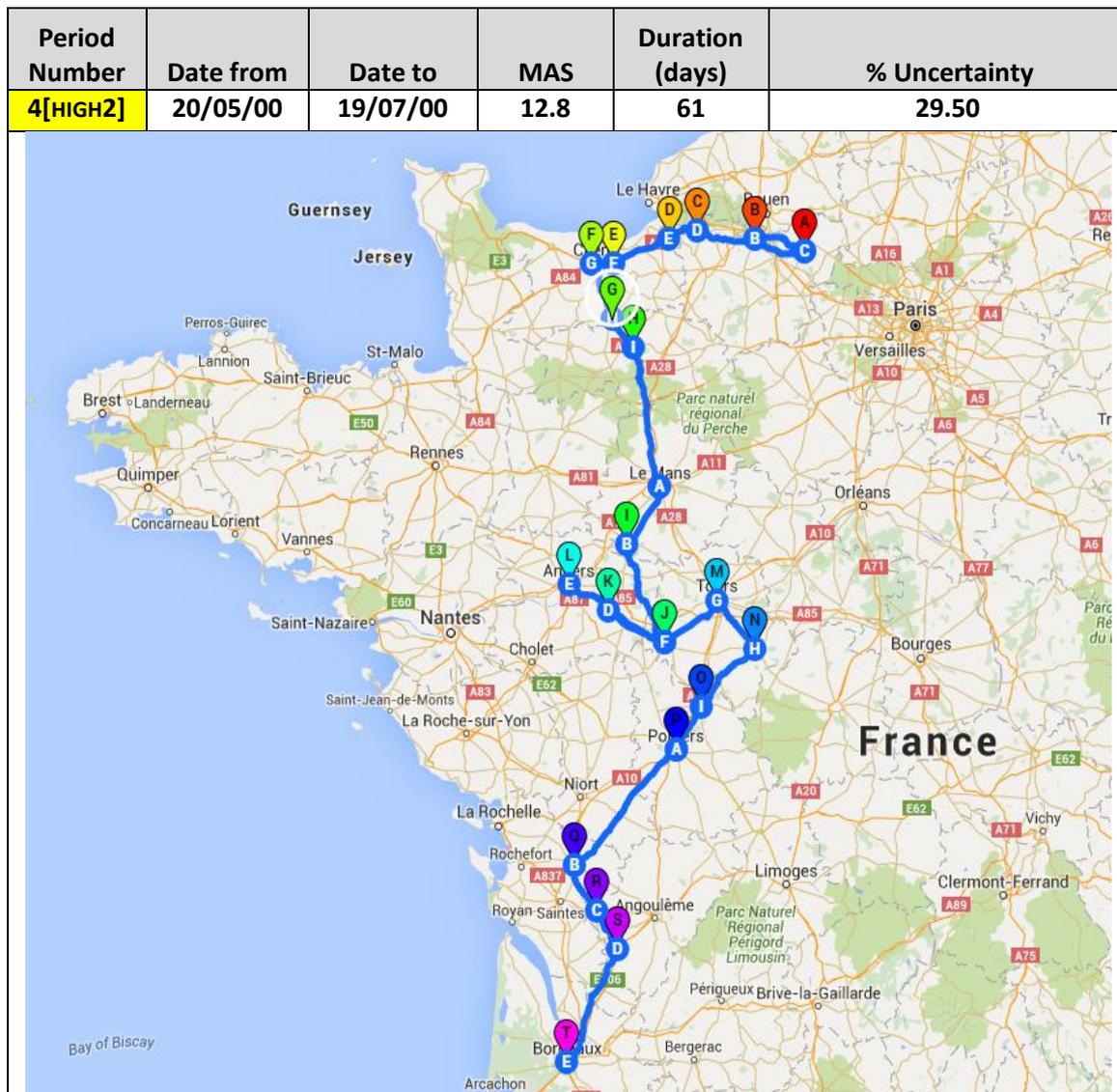
#### **4. Comment**

This is a period of low travelling activity (6.5MAS) that lasted 36 days, with an acceptable uncertainty of 25%. There are no records of any acts of commission or omission. King John's continuing irritation with the Cistercians is perhaps unusual but he had already revoked his previous excesses and so, perhaps even on account of that, it is possible to explain his behaviour on this basis. However, Coggeshall, by taking a direct quotation from Acts 9v1 and implying the analogy with Saul's activity against the early church, made his personal opinion entirely explicit.

#### **5. Evaluation period 3**

Although CPA has identified a low period of activity, there is no arguable evidence for bipolar behaviour during this period and it is likely to have resulted from external circumstances such as the imminent agreement of the Treaty of Le Goulet.

## Period 4



## 2. Travelling

The period starts at Andely (17–26 May 1200) with a day trip to Orival (25,26 May). King John then travelled west via Pont Audemer (28–30 May); Hebertot (30 May) and Troarn (1 Jun) to Caen (1–3 June). He then turned south, visiting Falaise (4/5 Jun); Argentan (5–8 Jun); Le Mans (9 Jun); La Fleche (10 Jun) until he reached Chinon (16 Jun) when he moved downriver (Loire valley) via Le Genest (18 Jun) to Angers (18–21 Jun).

From Angers, the king then returned upriver to Chinon (23–26 Jun) and Tours (26–30 Jun) before turning southeast to Loches (1 July) and then southwest to Châtelleraut (4 July), Poitiers (4, 7 July) and St Jean d'Angely (10 July). He then travelled southeast to Cognac (10/11 July) and Barbecieux (11, 13, 14 July) before resuming a southwesterly route to Bordeaux (14 & 18 July). During his stay at Bordeaux, the king visited Bois (16–18 July), a destination within one day's riding (18 Jul) and the

only location that the study was not sure enough to identify, given the number of choices in the area.

### 3. Primary Sources

Of the 20 sources investigated, 16 made comments on this period.

The **Barnwell Chronicler** notes that the kings met at Le Goulet on 16 June that the marriage of Louis and Blanche took place the following day at Portmort. The Count of Toulouse also appeared to give homage to King John and "*Deinde Johannes rex Angliae venit Andegavim et cepit ab ea centum quinquaginta obsides de fide sibi servanda et misit eos in custodia.*" (Then King John, King of England came to Anjou and took into his custody and protection, 150 hostages for [their] good faith.(my translation)) (Stubbs, 1873)p159,160,166.

**Diceto** and the **Annals of Burton upon Trent, Bury St Edmunds, Saint Aubin, Osney, Worcester, Burmondsey, and Dunstaple** also record the peace accord and the marriage of Louis and Blanche. The **Anonymous of Bethune**, describes a man in a hurry:

*se fist moult en haster duc de Normendie...; et ala en grant haste en Normandie et se fist roi. Puis rapassa la mer en grant haste por la guerre le roi de France; si ne demoura gaires que il fisent entre eus une pais si que Looyz li fils le roi de France prenderoit a fem le niece le roi Johan....*

(Michel, 1840)p90,91.

in much haste to be made Duke of Normandy.. ; and went in great haste from Normandy and was made king. Then recrossing the sea in great haste for war against the king of France; so without much delay they entered into a peace [agreement] so that Louis the son of the King of France took as wife the niece of King John....

my translation

**Gervase**, clearly writing retrospectively, presents the treaty but pauses to wonder how *Johannem mollegradium* ( John Softsword) became, over the passage of time, so cruel, unlike any of his ancestors or successors.(Stubbs, 1880)p92,93

**Hoveden** also writes that after the agreement King John "*set out for Aquitaine with a large army but no one was found to make head against him*". (Riley, 1853)p483.

The **Annals of Tewkesbury** records that King John is divorced (*divortium*) from Isabel Countess of Gloucester. **Hoveden, Wendover and Coggeshall** note that, on the advice of Philip, King John married the daughter of the Count of Angouleme. (Riley, 1853)p483, (Giles, 1849)pp188,103, (Stevenson, 1875)p103. Likewise the **Annals of Margam** record the king's marriage.(Luard, 1864)p25.

#### **4. Comment**

This is a period of high travelling activity (12.8MAS) that lasted 61days, with an acceptable uncertainty of 29.5 %. There are no records of any acts of commission or omission, nor any behaviour that is difficult to explain from circumstances. The Anonymous of Bethune confirms that King John was exhibiting high activity between the time of his accession and Le Goulet that might account for Periods 2 and 4. Hoveden wrote about King John's need for an accompanying large force for his first return to Aquitaine proved unnecessary but, it could equally be argued, this ensured his dominance over some who enjoyed rebellion. Two independent chroniclers give Philip the role of royal matchmaker between John and Isabella.

#### **5. Evaluation period 4**

Although CPA has identified a high period of activity, there is no arguable evidence for bipolar behaviour during this period and it is likely to have resulted from external circumstances.

## Period 5

Period Number	Date from	Date to	MAS	Duration (days)	% Uncertainty
5	19/07/00	13/08/00	6.45	26	76.92

## 2. Travelling

From Bordeaux (18th July), there are a series of 8 no-record days until King John is found due south at St Sever (27 July). The map renders this as a direct route although the terrain across Les Landes would have been difficult. It might justifiably be argued that he travelled upriver (La Garonne) to Langon before turning south. After St Sever, there are another 4 no-record days before he is found north east at Condom (1, 2 & 6 Aug), then La Plume (6 Aug) to finally Agen (11, 12 Aug) in the Garonne valley.

## 3. Primary Sources

Of the 20 sources investigated, 2 made comments on this period. The **Annals of Burton** note the king's divorce by the Archbishop of Bordeaux which may have taken place in his cathedral city. (Luard, 1864) p202. The **Annals of Bury St Edmund** says that King John led an army against the Gascons and all rebellion was subdued within a short time. (Arnold, 1892) p8.

#### **4. Comment**

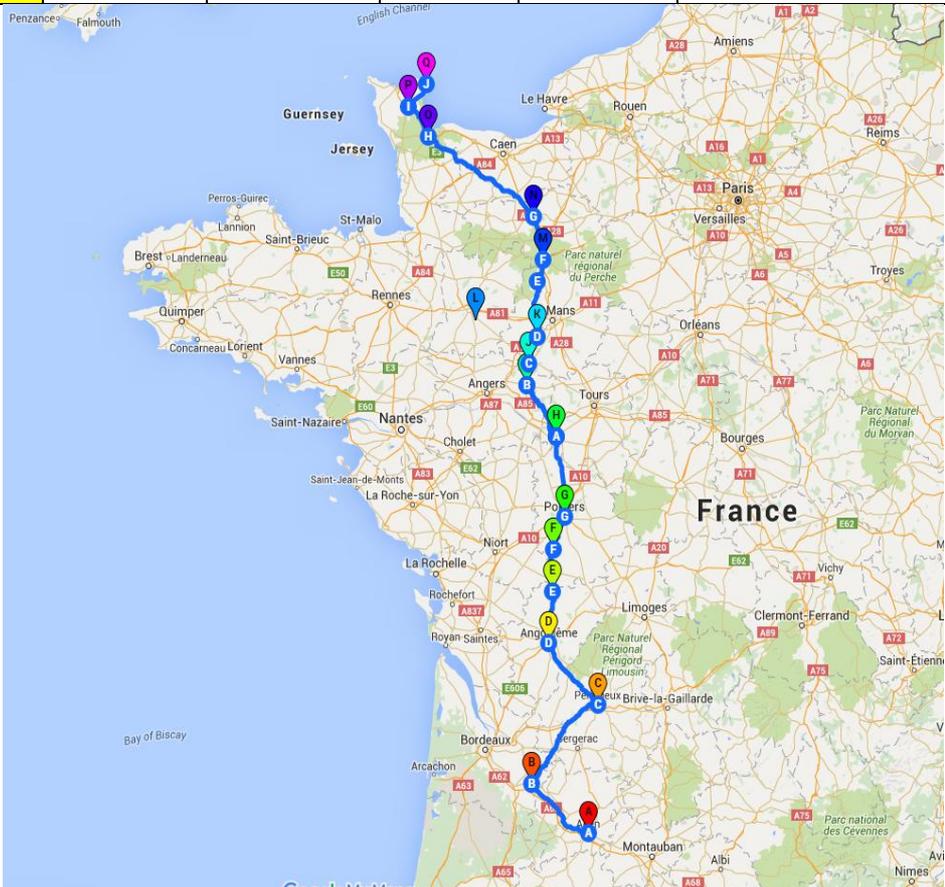
This is a period of low travelling activity (6.45MAS) that lasted 26 days, with an uncertainty of 76.9%. There are no records of acts of commission or omission, nor any behaviour that is difficult to explain from circumstances. Moreover, if King John was travelling with an army, then his activity level might be expected to be within this range. Against this theory, there are few significant settlements in Les Landes (Bordeaux/St Sever) that could act as a source of rebellion but equally, the large number of no-record days could accommodate a greater *chevauchée* than has been demonstrated by the itinerary.

#### **5. Evaluation Period 5**

Although CPA has identified a low period of activity, there is no arguable evidence for bipolar behaviour during this period and it is likely to have resulted from external circumstances such as travelling with an army and dealing with insurgency.

## Period 6

Period Number	Date from	Date to	MAS	Duration (days)	% Uncertainty
6[HIGH3]	13/08/00	17/09/00	12.4	36	30.60



### 2. Travelling

The period starts at Agen (11,12 Aug 1200) from where King John travelled downriver in the Garonne valley to La Reole (14–16 Aug) before turning northeast to Perigueux (22 Aug). He then continued northwest to Angouleme (26 Aug) and then northward to Ruffec (27, 28 Aug); Paye (28 Aug); Poitiers (28 Aug); Chinon(30, 31Aug); Baugé (1 Sept); La Fleche (2/3Sept); Suse (3/4 Sept); Frenay (5 Sept); Alençon (6-7Sept) before pausing briefly at Argentan (8–10 Sept). From there he turned northwest towards the Cotentin peninsula reaching Carentan (12 Sept) and Valognes (13,14 Sept).

### 3. Primary Sources

Of the 20 sources investigated, 10 made comments on this period.

The **Annals of Bury** records that the King was married to Isabella of Angouleme on St Bartholomew's day (24 Aug). **Hoveden** notes that "*the father of the damsel on seeing that John, king of England, had a fancy for her, took her out of the custody of Hugh le Brun and gave her in marriage*

to *John King of England* " (Riley, 1853)p 483. The **Annals of Burton** adds that the arrangement with Hugh le Brun could be broken because she was still not of marriageable age, with the ceremony being performed by the Archbishop of Bordeaux who had recently awarded King John's divorce. The **Annals of Osney , Worcester, Winchester and Waverley** also note the marriage and indicate that King John's first action was to take Isabella to England to be crowned. While they travelled north, the interdict on France was lifted, according to the **Barnwell Chronicler**. The **Annals of Dunstaple** likewise record the marriage and coronation but attributes events to the following year.

**Diceto** however records that the King was planning to marry the daughter of the King of Portugal, that the idea had caught the public imagination and that King John had sent a distinguished delegation drawn from both England and Normandy. However, while they were en route with no consideration of their position, King John married Isabella. Diceto notes too, the immediate crowning of Isabella and also the great enmity that developed between King John and Hugh le Brun as a result.

#### **4. Comment**

This is a period of high travelling activity (12.4MAS) that lasted 36 days, with an acceptable uncertainty of 30.6%. There are no records of any acts of commission or omission. King John's behaviour regarding his sudden marriage however is more difficult to explain from circumstances. For example, he appears to have given no thought to his active plans to marry into the house of Portugal. Equally, King Philip may not have welcomed yet another Angevin alliance on the Iberian peninsula and was well aware of the history of rebellion and trouble that was rooted in the House of Lusignan against their Poitevin overlords. This suggests naivety on the part of King John in accepting the advice of the French king for which, it could be argued, King John had a previous record. (When King Richard returned from imprisonment, he excused his brother his misdemeanours because he had received bad advice (King Philip's).)(Gillingham, 1978)p247. Yet this does not explain Hoveden's comment which suggests that King John was more than a willing partner in the venture and continued to be a doting husband.(Riley, 1853)p483.

#### **5. Evaluation period 6**

CPA has identified a high period of activity that shows arguable evidence for bipolar behaviour during this period , namely the circumstances surrounding his second marriage.



## **2. Travelling**

### **Map 1**

The period starts at Barfleur on 17 Sept 1200 with King John moving between Gonneville sur Saire (20–22, 25 Sept) Valognes (23,24 Sept & 1 Oct), Cherbourg (25,26 Sept) and Morfarville (27 Sept)

### **Map 2**

The king crossed the Channel sometime between 2nd and 5 Oct which also includes his overland journey from the coast to Freemantle (6 Oct). He was located at Westminster(10 Oct) from where he travelled southwest via Guildford (11, 12 Oct), Ashley (13, 14 Oct), Clarendon (15, 16 Oct) to Marlborough (19, 20 Oct) before following a half hoop anticlockwise circuit over 1week via Cricklade (21 Oct); Chelsworth (21,22 Oct); Malmesbury (23 Oct); Bradenstoke (23,24 Oct) and Stanley (25 Oct) before arriving at Melksham (26 Oct).

He then travelled west towards the Severn coast to Winterbourne (28 Oct) and north to Berkeley (28 Oct) on the English side of the river and thence to Gloucester (29, 30 Oct). At Gloucester he crossed the river and headed southwest via Westbury (31 Oct) to St Briavell's (1, 2 Nov) before turning north to Hereford (4 Nov)

From Hereford he travelled east to Ledbury and south west to Upton Bishop before backtracking north east to Feckenham, northwest to Bridgnorth and northeast to Great Haywood near Cannock Chase. He moved east to Nottingham, via Burton upon Trent and Melbourne, then north to Clipstone and east to Lincoln (21-26 Nov).

He then headed southward travelling to Sleaford (26/27Nov) and Stamford (27Nov) before turning southwest to Northampton (29Nov) via Geddington (28 Nov)and continues on nearly the same compass bearing via Abingdon (2, 3 Dec); Bedwin (3 Dec); Ludgershall (4, 6 Dec); Clarendon (7 Dec) and Cranborne (10 Dec) to Canford (12, 13Dec) before turning south east to Christchurch (13 Dec).

Four days later he travelled due north to Marlborough (17 – 19Dec) before turning south east via Freemantle (20, 21Dec) to Farnham (23 Dec) and then north east via Guildford (26 Dec) and Reading (26 Dec) to Woodstock (28Dec – 1 Jan), where presumably he celebrated a late Christmas.

## **3. Primary Sources**

Of the 20 sources investigated, 15 made comments on this period. **Wendover** writes that King John brought Isabella to England (8th Oct) landing at Dover before travelling to Westminster for their joint coronation by the Archbishop of Canterbury. About this time, King John summoned William King of Scots to meet him at Lincoln on 20th Nov. Meanwhile in London, King John visited Hugh Bishop of Lincoln who was terminally ill and subsequently died on 17 Nov. **Wendover** describes the ceremonial meeting of the two kings in Lincoln and that King John broke with tradition by entering

the city of Lincoln and placing a gold cup on the altar of the cathedral. He also records the funeral of Hugh Bishop of Lincoln, before noting that King John celebrated Christmas at Guildford by distributing festive garments among his knights.(Coxe, 1841)p155 – 165.

Wendover's account is echoed in its main elements by the **Annals of Waverley, the Barnwell Chronicler, Hoveden and Coggeshall** who all add comparable descriptions of King John's interactions with the Cistercian Abbots and which have been previously described (see Sections 5.3.2 and 5.4.6).

Likewise the **Annals of Bury St Edmunds** describe the coronation (8 Oct) at Westminster and Christmas at Guildford. **Diceto** and the **Annals of Margam, Burton, Tewkesbury, Osney, Dunstaple, Worcester, Winchester and Waverley** note the funeral of Hugh of Lincoln, with **Margam** also recording that the king was on his knees on the ground in front of the Cistercians.

#### **4. Comment**

This is a period of low travelling activity (6.8MAS) that lasted 106 days, with an acceptable uncertainty of 25.5%. There are no records of any acts of commission or omission. These sources however do not make any comment on King John's prolonged perambulation that occurred between the coronation at Westminster and his arrival at Lincoln. King John's behaviour with the Cistercian Abbots however, attracted the attention of the Barnwell Chronicler, Hoveden, Coggeshall, the Annals of Waverley and Margam of which the latter three were part of the Cistercian order. Despite this apparent bias and likely similar information source, they all describe behaviour by the king that is difficult to explain from their circumstances but attributed by Hoveden, the Barnwell Chronicler and the Annals of Waverley to "*inspiratione divina*" (Luard, 1865)p254.

#### **5. Evaluation period 7**

Although CPA has identified a low period of activity, there is arguable evidence for bipolar behaviour during this period and cannot be explained from external circumstances, namely the king's interaction with the Cistercian Abbots.

**Period 8**

Period Number	Date from	Date to	MAS	Duration (days)	% Uncertainty
8[HIGH4]	01/01/01	07/05/01	9.8	127	29.13



**2. Travelling**

The Period starts after King John celebrated a late Christmas season (25Dec – 6 Jan) at Woodstock (28Dec 1200 – 1 Jan 1201). The king begins an anticlockwise circuit to the north, calling at Silverstone (3 Jan); Geddington (6–8 Jan); Bourne (9 Jan) until his arrival at Lincoln (12, 13 Jan) and Stow (13,14 Jan). He then turned east to Louth (18 – 21Jan) before crossing the Humber to reach Beverley (25 – 27Jan); Driffield (27, 28 Jan), and Pickering (1 Feb). The itinerary places him at Imingham (28 Jan) on the south bank of the Humber (marked as J) and omitted from the map for the sake of clarity. From Pickering, the king travelled to the coast at Scarborough (3 Jan) and followed its contours northward via Egton (4 Feb), Guilsborough (5 Feb), Stockton (6 Feb); Durham (7, 8 Feb); Newcastle upon Tyne (9, 10 Feb); Belford (11 Feb); Alnwick (12 Feb) to Bambrough (13 – 15 Feb). From there, King John turns west to cross the Pennines (modern A69 ) via Hexham (16 – 19 Feb), Irthington (20 Feb) to Carlisle (21 – 23 Feb). He then travels south via Kirkoswald (25 Feb); Morton

(25,26 Feb); Ravensworth (26,27 Feb) to recross the Pennines (modern A66) to Allerton (28 Feb) and York (1, 2 Mar). From there, he continued south via Brotherton (4 Mar); Conisbrough (5 Mar) and Clipstone (6 Mar). He backtracks northeast to Bolsover (8 Mar) before continuing south to Nottingham (10–12 Mar). The king then travelled east to Aslacton (13 Mar) before turning south again to Geddington (14,15 Mar) and Kimbolton (15 ,16 Mar). From Kimbolton, King John turned eastward towards East Anglia, calling at Bernewell ( 17 Mar); Bury St Edmunds (19 Mar); Sudbury 20 Mar) and Chelmsford (21 Mar). Two no-record days account for the time when he must have crossed the Thames to reach Faversham (24, 25 Mar) and Canterbury (25–28 Mar; Easter day 25 Mar) in Kent.

By the 1 April the king was at Westminster (1 – 3 Apr), before he moved west to Windsor (4 – 6 Apr), Freemantle (7 Apr), Marlborough (7–10 Apr) and Ludgershall (10–12 Apr). At this point, he turned south into Dorset, calling at Cranborne (15 Apr), Dorchester (18, 19 Apr) and Bridport (20 Apr) before reaching Exeter (22 Apr) in Devon. Following 7 no-record days, King John is then found at Woodstock (30 Apr) again north of Oxford, having completed a full circuit in the approximate form of a figure of eight. From there, he headed near-west to Tewkesbury (30Apr, 1 May) before turning southeast to Cirencester (2 May), Marlborough (3, 4 May), Ludgershall (4, 5 May) to reach Winchester (6, 7 May), in advance of his departure for France from Portsmouth sometime after 14 May.

### **3. Primary Sources**

Of the 20 sources investigated, 10 made comments on this period.

**Hoveden** start his account of this period at Lincoln where he records, King John went to arrange the appointment of its new bishop. The process stalled as King John wished to appoint his own man whereas the clerics wished to elect him. The chronicler continues with King John crossing the Humber (Jan 25) and then welcomed to Cottingham where his host was William de Stuteville.(Riley, 1853)p517. According to the **Chronicler of Barnwell** who writes a similarly detailed account of the period, King John had recently obtained a settlement of an ancient dispute between William de Stuteville and William de Mowbray at Louth ( Jan 21) and presumably de Stuteville was travelling home with the king's party.(Stubbs, 1873)p161, 162; (see Section 5.4.1 p159). Cottingham lies between the north bank of the Humber and Beverley and the account is entirely plausible from the itinerary.

There follows an odd account where **Hoveden** says King John was bribed by John le Gros to stay with him, a man who had been recently excommunicated by Geoffrey Archbishop of York, King John's older step brother and between whom there was little love loss.(Riley, 1853)p501. The Archbishop was in dispute with the king's men over the collection of royal taxes and had

excommunicated many who tried to do so within his lands. In addition, the Archbishop had specifically forbade the celebration of Mass or the ringing of bells in Beverley town, a stricture that King John insisted that they comply with during his visit. Despite this, **Hoveden** notes that King John imprisoned one of the Archbishop's servants for denying the King access to the prelate's wine, and then extended the order for arrest to include all servants of the Archbishop.(Riley, 1853)p519.

**Hoveden** continues, noting that the royal couple visited Scarborough and then went north " *as far as the borders of his kingdom*" and " *compelled them to pay fines under forest law in compensation for laying waste.*"(Riley, 1853)p519. The **Chronicler of Barnwell** gives a similar account of the King's sojourn at Beverley, his subsequent journey north, and the reason for the fines. He also accounts for King John's four day stay at Hexham as a result of a treasure dig at Corbridge nearby. Carved stones, and some iron and lead were all that were recovered and may well have been Roman remains given the relationship of Corbridge to Hadrian's Wall.(Stubbs, 1873)pp180, 181. The **Annals of Bury** writes that " *Rex adiit Northumbriam ubi magnam adquisivit pecuniam.* " p8 (The king approached Northumbria and acquired a lot of money).(Arnold, 1892)p8.

**Hoveden** writes that at York (1, 2 Mar), on the southward leg of the circuit, the king reached an accommodation with Geoffrey, his step-brother before travelling on to Canterbury where they were crowned again on Easter day (25 Mar). This second coronation, as opposed to crown wearing, is also the source of comment in **Diceto, Gervase, and the Annals of Chester, Margam, and Burton upon Trent**.(Stubbs, 1876)p172; (Stubbs, 1880)p93; (Christie, 1887)p46; (Luard, 1864)p25,p206.

**Hoveden and the Annals of Burton** give similar accounts of the general mobilization that followed Easter when the king required his barons and their men to be at Portsmouth at Pentecost in preparation for a grand embarkation and campaign in Poitou.(Riley, 1853)p521,522, (Luard, 1864)p206. When the barons demurred following at meeting at Leicester, the king following bad advice demanded possession of their castles beginning with William d'Aubigny [and his] castle of Beauvoir. To avoid this, D'Aubigny delivered his son as hostage to King John. However, **Wendover**, the Prior of Beauvoir, makes no comment on this, and also differs on the date of the call to arms, saying that it occurred much later at Tewkesbury (30Apr,1 May).(Giles, 1849)p201. He is supported in this by the **Annals of Bury St Edmunds** who also describes its terms:

*" Dominica ante Ascensionem (29 April) apud Theokesbir multis magnatibus congregatis, edictum propositum est, ut comites et barones regis cum rege tranfretarent quod et quidam fecerunt, alii vero impetrata remandendi dederunt 2 marks ...de quolibet scuto."*  
(Arnold, 1892)p8.

([On the] Sunday before Ascension Day (29 April) at Tewkesbury with many barons gathered, a edict was pronounced calling the King's nobles to cross the Channel with the king [to serve] as required or pay 2 marks in lieu per scutage.

(my translation)

However there is no comment in the **Annals of Tewkesbury**. Likewise **Coggeshall** reports the rebellion of Hugh le Brun during this period and places the Channel crossing as a response to this activity.(Stevenson, 1875)p128, 129.

#### **4. Comment**

This is a period of high travelling activity (9.8MAS) that lasted 127days, with an acceptable uncertainty of 29%. The destination of Imingham (28 Jan) may represent a clerical error in dating (perhaps should read XXiii rather than XXviii) as it is unlikely that King John crossed the Humber three times, even if supervising the transport of goods. Although his stay at Hexham is attributed to treasure hunting, this may equally well have been a brief diversion while waiting for better weather. Equally, his route backtracks to Bolsover suggesting that there may have been issues with a number of river crossings e.g.crossing the river Ryton and so deviating east to use Furnival's bridge at modern day, Worksop. There are no records of any acts of commission or omission. Some behaviour however is difficult to explain from circumstances.

There is evidence of heavy handedness, such as in his insistence on the resolution of the ancient legal dispute between Stuteville and Mowbray de Stuteville. In addition, it could be argued that King John was disproportionate in his actions by taking general umbrage against the servants of the Archbishop of York; by imposing punitive fines on those in Northumbria, a county he withheld from their traditional lord, the King of Scots, and by calling a general muster of armed forces to Portsmouth in response to the Lusignan misbehaviour. Although the fines fed his need to finance a military campaign, his insistence on exacting his feudal dues suggests an overuse of royal powers. Taken in totality, these elements might accrue greater significance than the sum of their parts.

Less easily explained is his second coronation, not just crown wearing, at Canterbury that was of sufficient import to be recorded by six writers, although Wendover insinuates that it was in revenge for the Archbishop's competitive attempt to outdo the king in his pomp and present-giving during the previous Christmas.(Coxe, 1841)p155. Equally, although King John's judgement was called into question over his handling of d'Aubigny and others, and blamed on bad advice, the king compounded the injury soon after by raiding their petty cash at Portsmouth.

#### **5. Evaluation period 8**

The CPA has identified a high period of activity which shows arguable evidence for bipolar behaviour during this period such as the abuse of the processes of justice with loss of proportionality, a second coronation for no political purpose and highhandedness in his interactions with his barons.

### 6.3 Chapter 6: Summary

A summary of this investigation, drawing on the periods presented above and those in Appendix 9 is shown in Table 31. For consistency, examples of evidence not explained by circumstances were divided into three groups - acts of commission and omission, and behaviour that was difficult to explain. All groups were demonstrated, most particularly in 16 [HIGH6].

**Table 31: Evidence Not Explained by Circumstances in Sequential Periods 1200-1203 inclusive**

Sequential Period [COMPLIANT PERIODS]	Evidence (type)			CPA polarity
	Acts of Commission	Acts of Omission	Difficult to explain behaviour	
1				LOW
2[HIGH1]			✓(high)	HIGH
3[LOW1]				LOW
4[HIGH2]				HIGH
5				LOW
6[HIGH3]			✓(high)	HIGH
7[LOW2]			✓(low)	LOW
8[HIGH4]			✓(high)	HIGH
9[LOW3]				LOW
10				LOW
11				LOW
12			✓(high)	HIGH
13				HIGH
14[LOW4]				LOW
15[HIGH5]				HIGH
16[HIGH6]	✓(High)	✓(high)	✓(high)	HIGH
17				HIGH
18[LOW5]		✓(low)	✓(low)	LOW
19[HIGH7]				HIGH
20				LOW
21[HIGH8]	✓(high)	✓(high)		HIGH
22[LOW6]	✓(low)	✓(low)		LOW
23 [HIGH9]	✓(high)	✓(high)	✓(high)	HIGH

Circumstantial evidence explained 13 periods - 3 high; 3 low and 7 non-compliant periods. Ten periods showed evidence not explained by circumstances (7 high; 3 low) of which all but one (Period 12 high) were ICD-10 compliant.

**Table 32: Odds Ratio table of circumstantial evidence vs. alternative**

Comparison of all periods ( compliant+noncompliant) N=23	Explained by circumstances	Alternative explanation
High periods /all high periods	5/12 (41.6%)	7/12(58.3%)
Low periods /all low periods	8/11(72.7%)	3/11(27.2%)

Table 32 shows that high periods were nearly equally divided between those explained by circumstances and those not explained/alternative explanation (41.6% vs. 58.3%), a finding confirmed statistically using Odds Ratio (OR 0.26 CI: 0.04, 1.54 @95%). This contrasts with the similar analysis of low periods that shows that those explained by circumstances were three times as common (27.2% vs. 72.7%) (OR =3.73 CI 0.64,21.5 @95%). This suggests that low periods were three times more likely to arise from circumstances than alternatives but that high periods could arise from either.

In summary therefore, this 4 year investigation period found 17 examples of evidence from 129 accounts. When referenced against the CPA periods, this circumstantial evidence was found to relate to 10/23 periods, of which all bar one (Sequential Period 12) were ICD-10 compliant. The pattern of behaviour showed 100% concordance with the polarity of its CPA period i.e. where possible bipolar behaviour was found it was always during a CPA period of appropriate polarity. This is not only indicative of diagnostic stability but is also difficult to explain as arising from chance, since this would present randomly distributed evidence across all types of periods.

The study therefore rejects the third null hypothesis to suggest that ***there is historical corroborative circumstantial evidence of bipolar disorder associated with periods of significant change in King John's travelling activity.***

## Chapter 7: Discussion

*Was King John of England (1199-1216) bipolar? a medical history using mathematical modelling*

In considering the diagnostic question – *Was King John of England (1199-1216) bipolar?* – this chapter concludes the submission by presenting *a medical history* of King John (Section 7.1) based on the study findings described in Chapters 5 and 6 and the descriptive analysis ( see Section 3.3). The temporal relationship of these findings is validated by the identification of high and low activity periods *using mathematical modelling* by Change Point Analysis (see Chapter4).

A medical history is a heuristic process that collates the positive and the relevant negative facts and findings concerning the illness of an individual patient. It is formally presented under time-honoured headings in order to reach a differential diagnosis and from that, a working diagnosis. (Cox and Roper, 2005) This chapter then explores the study limitations (Section 7.2); offers suggestions for future work (Section 7.3), before concluding the submission (Section 7.4).

### 7.1 A medical history of King John

The medical history in this case differs from normal practice in that the presenting complaint is not described by the patient but by those around him, although this is not an uncommon finding in situations relating to mental health. Importantly, the **specific and systematic questioning** of John, his **past medical history** and **medication and allergy history**, cannot be obtained.

A working diagnosis of bipolar disorder has already been made by Dutailis, so this medical history reviews the evidence in that light and considers other alternative diagnoses (see Section 2.2). Perhaps more unusually, the working diagnosis was made *post mortem*, making this medical history a reputational matter, rather than one of clinical management. In addition, for the sake of interdisciplinary clarity, some sections contain additional information beyond the usual medical remit.

#### 7.1.1. Presenting Complaint

John of Oxford (1166-1216) was a medieval king who governed England, Ireland and the western half of modern day France between 1199 and 1216. His main symptoms were that, according to his contemporaries, he exhibited **actions and inactions that were incomprehensible** in the light of circumstances and that he was **inconsistent**, as for example being sometimes heavy handed in the exercise of kingship and sometimes lenient, and was also prone to changes of opinion. Evidence of

these issues spanned his reign and may have been present before his accession. In particular, the symptoms are associated with the loss of Normandy (1204) and civil unrest in England (1215). (see Chapter 1 Overview and Section 2.2)

### **7.1.2 History of Presenting Complaint**

The history of the presenting complaint not only includes the customary sections listed below but, in this particular case, its actual historical evaluation. As shown in Chapters 1 and 2, later writers and modern historians have described the elements of the presenting complaint but have presented no additional insights from concurrent documents or hindsight. Although some historians considered John to have been morally deficient, Charles Petit-Dutallis, having found supportive contemporary accounts and a positive family history, suggested that bipolar disorder might offer a unitary explanation for King John's behaviour (see Section 2.2).

#### ***Clinical presentation***

- **Diagnostic criteria**

Bipolar is a condition that affects both mood and activity concurrently. The ICD-10 diagnostic criteria stipulates that symptoms appropriate to either mania or depression must be related in time i.e. occurring together within high periods of greater than 4 days duration or within low periods lasting more than 14 days respectively(see Section 2.3).

Five of the 9 diagnostic symptoms for mania/hypomania were associated with statistically identified high periods of activity. Likewise, 4 of the 9 diagnostic symptoms for depression were associated with statistically identified low periods of activity. All symptoms bar one were described in the primary sources (92%). The polarity of symptoms matched the polarity of the activity periods identified by the mathematical model (see Section 5.5; Table 27). Such a pattern of concordance is highly unlikely to have occurred by chance.

The five diagnostic symptoms for the mania/hypomania spectrum were physical restlessness; decreased need for sleep; sexual indiscretions; reckless behaviour, and inflated self-esteem and grandiosity. Of these, evidence of all but the first was obtained directly from dateable primary sources; physical restlessness has been noted by subsequent historians and supporting data for this symptom generated by the study. Without direct questioning, it was not possible to elicit evidence of increased talkativeness, flight of ideas, increased sociability or loss of normal social inhibitions, as would be the case in current clinical practice. Equally, constant changes in activity or plans might be inferred from periods of constant changes in location but this cannot be confirmed without evidence of his original intentions (see Section 5.2).

The four diagnostic symptoms for depression were increased fatiguability; diminished ability to think; increased sleeping, and low psychomotor activity. Evidence for all of these was obtained from dateable primary sources. Again, without direct questioning it was not possible to elicit evidence of depressed mood; loss of interest; loss of self esteem; unreasonable self reproach; recurrent thoughts of death/suicidal behaviour or change in appetite leading to weight change, as would be the case in current practice (see Section 5.3).

- **Additional Behavioural findings**

From the bipolar literature, a further 8 potential bipolar symptoms were also identified of which all but one were described in the primary sources (88%). Six were related to mania and found during periods of high activity: heightened capacity for work; anger; suspiciousness; incongruent affect, homicide and switching. Evidence for all but the first was obtained from dateable primary sources; the heightened capacity for work was identified by secondary analysis. Evidence of diagnostic stability was demonstrated by the concurrence of anger in more than one high period. Two symptoms – blame and tearfulness – were related to depression and found during low periods of activity; evidence for both was obtained from dateable primary sources (see Section 5.4).

- **Natural history: lifetime and daily presentation**

The history of the presenting complaint extends over a 17 year period. This allows its natural history to be evaluated both as a global overview and on a daily basis. Graphical comparison of John's changes in activity with published accounts of lifetime presentation (Figure 24 vs. Figure 2) shows similar variations in the scale of polar change and similar patterns of recurrence with an increased number of episodes when patients were aged 35-40y (comparable years 1201 to 1206).(Post et al., 1988) Likewise, John's daily presentation shows similarities of scale and recurrence with evidence of brief movements to the alternative pole during established periods, as shown in published accounts. (Figure 25 vs. Figure 3).(Roy-Byrne et al., 1985) For further details see Sections 2.3 and 4.2.

### ***Aggravating Factors***

Three possible aggravating factors were found. Firstly, John is known to have ordered large quantities of alcohol on several occasions and while much will have been to supply the court, there is implied evidence of his personal consumption. One such period was associated with a prolonged Channel crossing and followed by a low period – of both activity and administration – that lasted several months (see Sections 5.4 & 5.5). Self medication using alcohol is well recognised in all mental illnesses. In bipolar disorder it is twice as likely in men than women and associated with a "worse

*outcome and refractoriness to treatment*".(Nery et al., 2010, Peitraszek et al., 1991). For further details see Section 2.3.7.

Secondly, his reaction to bereavement was noted on two occasions. Both occurred during pre-existing low periods of activity: in one, he was noted to be tearful in public whilst in the other, he exhibited agitation before secretly fleeing the court (see Sections 5.4.10 and 5.5). Bereavement during depression is associated with "*a substantial burden of co-morbid grief related illness and impairment*" and an increased risk of suicide.(Simon et al., 2005), (see Section 2.3.7) Evidence of this might be inferred from the action of the royal physicians who were concerned about King John and arranged to bleed him (see Sections 5.4.6 and 5.4.10).

Lastly, his behaviour appeared to be influenced by time and seasons. The former illustrates changes in circadian rhythm, when he was noted to sleep more during a low period and less during a high period. If this is so, then his dash to Mirebeau, with its enforced loss of sleep, may have accentuated his pre-existing high state. In addition, analysis of his seasonal activity shows a pattern for both mania and depression that is typical of bipolar disorder with Figure 36 (p104) demonstrating that mania is more common in Springtime and likewise depression which has also a secondary peak in Autumn (see Sections 2.3.7, 3.3.2, 4.3.2, 5.2.2, 5.3.4 & 5.5).

### ***Mitigating Factors***

No mitigating factors, or influences that lessened the effects of illness, were identified except perhaps the circumstantial evidence that the changes in his activity become less marked after Gilbert Anglicus become his physician ( circa 1207) and appear to have recurred after 1214, when Gilbert had gone to Rome (see Section 2.3.3).(Getz, 2004) This is not entirely fanciful as modern management of bipolar disorder includes the avoidance of alcohol and ensuring regular sleeping times, and both these remedies would have been available to Gilbert.

### ***7.1.3 Family History***

An important feature of bipolar disorder is the strong family history of both traits associated with bipolar disorder and the accounts of the condition itself (see Section 2.3.4). John's father was Henry II of England (1133-1189), Duke of Normandy, Count of Anjou and by right of his wife, Duke of Aquitaine. He was renowned for his unpredictability and for working "*as need dictated or the mood took him*"; contemporaries such as John of Salisbury and Thomas Becket called him "*Proteus*". (Warren, 1973)p209 (Jolliffe, 1963)p20. He married once, to Eleanor (c1122 -1204), sole heiress of Aquitaine and recently divorced (1152) ex-wife of the king of France, Louis VII (1121 -1180) (see Section 2.1).

John's paternal grandparents were the Empress Matilda, heiress of the Norman King Henry I of England, and Geoffrey Count of Anjou, her second husband. Their two other younger sons —John's uncles – Geoffrey and William died before John's birth.(Chibnall, 1991) There is some evidence suggestive of mental illness in the ancestry of Geoffrey of Anjou where the elder sister Ermengarde of King John's great-grandfather, is alleged to have been subject to significant and violent mood swings and which resulted in her divorce from Eleanor of Aquitaine's grandfather William IX, but before they had children. However, Ermengarde remarried and became the great-great-grandmother of Constance of Brittany, mother of Arthur, King John's nephew.(Weir, 2000) Equally, both the Houses of Anjou and that of neighbouring Lusignan claimed descent from Melusine, a "fairy woman" described in various West European mythologies as having a life altering secret and a habit of suddenly changing form.(Warren, 1978)p3,(Weir, 2000)pp77,78.

John's maternal grandparents were Aenor of Chatellerauld and William X, Duke of Aquitaine. Aenor became the mistress of her father-in-law (William IX) but had no children by him. Both men had tempestuous and argumentative natures and were often in conflict with both the church and their barons. William IX (John's great-grandfather) gained the epithet "the troubadour" for his emancipated lifestyle and his poetry of which 11 works survive. (Weir, 2000) These range in tone from high excitement to pensive melancholia and are illustrated by two quotations:

**Song 4 v 1, 2**

I'll do a song about nothing at all;  
 It won't be about me nor about others,  
 It won't be about love nor about happiness  
 Nor about anything else,  
 For it was composed earlier while [I was] sleeping  
 On a horse.

I don't know what time I was born,  
 I am not happy or sad,  
 I am not a stranger or an intimate friend,  
 Nor can I do anything about it;  
 For so I was enchanted at night  
 Upon a high hill. ...

William, IX Duke of Aquitaine  
 (Bond, 1982)p15

In explanation, Bond suggests that the "*effect of amor (love/desire) was compared to a magical enchantment*" and "*the image of sleeping on a horse is often used to suggest the unreal aspect of the content of the song*", perhaps not unlike our current usage of the term "nightmare". (Bond, 1982)p63. This however, assumes sanity. A medical interpretation might note such high creativity but also consider a psychotic episode, perhaps comparable in experience to that described by Jamison: "*People go mad in idiosyncratic ways. Perhaps it was not surprising that, as a*

*meteorologist's daughter, I found myself, in that glorious illusion of high summer days, gliding, flying, now and again lurching through cloud banks and ethers, past stars, and across fields of ice crystals.*"(Jamison, 2014)loc 979.

In contrast, Song 11 is concerned with "*what is making him [the Count] sad*". (Bond, 1982)p79.

**Song 11 v8**

*... I was very charming and gay,  
But Our Lord wants no more of that;  
Now I can no longer tolerate the burden  
So close am I to the end. ...*

*William, IX Duke of Aquitaine  
(Bond, 1982)p43*

Song 11 can be dated to the period between August and November 1119, when the Count was known to have been unwell and was unable to attend a Papal conference. (Bond, 1982)pxxxii. In addition, there is also evidence from a charter concerning land transfer from this timeframe, that begins "*While we have light, let us do good to all, as it is proper for us to do...*", again suggestive of a depressed turn of mind. (Bond, 1982)plii

In summary this suggests that John had a strong family history of possible bipolar traits from both maternal and paternal ancestors, a finding that is not unexpected given the evidence that "*traits associated with bipolar disorder are beneficial for leadership, while the actual disorder is detrimental*" and that this effect is attenuated by IQ (see Section 2.3.6).(Kyaga et al., 2015)

#### **7.1.4 Personal & Social History**

John, born 24 Dec 1166, was 32years old when he acceded to power and died two months before his 50th birthday (see Section 2.1).

- **Mother's pregnancy and birth**

No details are known of John's birth other than that, like his elder brother Richard, it occurred in Oxford. He was the tenth and last known pregnancy of his mother Eleanor of Aquitaine, who would have been about 44 years old and nearing the peri-menopause (see Section 2.1).

- **Family history, Childhood and Education**

John was the youngest child of older parents who separated acrimoniously shortly after his birth. His father died when he was 23y; his mother when he was 38y. John was brought up and educated at the monastery of Fontevraud in the company of his closest sibling, Joanna. He was literate and in later life owned a library and borrowed books (see Section 2.3.6).(Warren, 1978)p140.

John had an extensive but mainly unsupportive family. His two stepsisters from his mother's first marriage to the King of France: Marie (+21y older) and Alice (+16y) both died before his accession in 1199. He had seven full siblings from her second marriage to Henry II of England: three surviving brothers: Henry (+11y), Richard (+9y) and Geoffrey (+8y), and three sisters: Matilda (+10y), Eleanor (+5y) and Joanna (+1y). John's oldest sibling William (b.1153), died in infancy.(Owen, 1993)p44. Henry II also had three acknowledged illegitimate offspring of whom the most important to John were Geoffrey Plantagenet, Archbishop of York (1191-1212) and William Longsword, Earl of Salisbury( c1176-1226).(Warren, 1978)

His older brothers Henry, Richard and Geoffrey were close to each other but distant from John: Henry died from dysentery when John was 17y and Geoffrey was killed in a jousting accident 3 years later. Richard had always been close to his mother, and John became his father's favourite, so much so that King Philip of France was able to play on Richard's fears that his younger brother might supplant him and deny the rules of primogeniture.(Warren, 1973)p617 Later, Richard as king exhibited a surprisingly tolerant attitude to John's misjudgements.(Gillingham, 1978)p247.

John's sisters become wives: Matilda to the Duke of Saxony; Eleanor to the King of Castile and Joanna first to the King of Sicily and then to the Count of Toulouse. All the girls predeceased John: Matilda died in 1184 of unknown causes; Joanna, following serious burns during pregnancy, died in 1199 and was interred beside her brother Richard at Fontevraud; Eleanor died in 1214, purportedly overcome by grief following the death of her husband.(Warren, 1978)

Of John's natural brothers, Geoffrey Plantagenet had a long history of being argumentative, including with John; William Longsword was John's constant supporter until the last months of his life and reign.(Warren, 1978)

- **Occupation**

John's personal life was interwoven with his external commitments namely his accession to the English throne (1199-1216), which was both unexpected and contested, and his associated responsibility for Ireland, Normandy, Maine and Anjou, and together with his mother, the Duchy of Aquitaine. Moreover his French overlord, Philip King of France was less a royal colleague and more an adversary, with tenacious ambitions to both reduce the powerful Plantagenets and to increase his own sphere of direct influence (see Section 2.1).

- **Marital status & children**

John married twice – the first in 1189 to Isabelle, heiress to the County of Gloucester, had no issue. His second marriage following divorce was widely anticipated but his choice of Isabella, the heiress to Angouleme, was a general surprise (1200). She is thought to have been about 12 years old, and

some twenty years her husband's junior. Their first surviving child Henry, was born 7 years later (1 Oct 1207) followed by four further surviving children: Richard (5 Jan 1209); Joan (22 July 1210); Isabella (1214) and Eleanor (1215).(Warren, 1978)

- **Sexual relationships**

John took mistresses, as was the custom, and had 7 identifiable bastards, in comparison to 1 by his brother Richard, 3 by his father Henry II and 20 by his Norman great-grandfather, Henry I. (Given-Wilson and Curteis, 1984)p179. Towards the end of his reign, the English barons accused him of breaching cultural norms by having liaisons with their wives and daughters (see Section 2.1).

### **7.1.5 Living conditions**

It can safely be assumed that John as king would have had better accommodation, creature comforts and diet, than many of those around him (see Section 2.4.3).

### **7.1.6 Travel History**

John travelled widely across the British Isles and north-west Europe. There is some uncertainty as to whether malaria was present in the British Isles before 14th century as descriptions of fever are more typical of endemic typhus (see Section 2.4.3).(Chin and Welsby, 2004)

### **7.1.7 Forensic history & substance misuse**

Contemporaries noted that John's nephew Arthur (son of full brother Geoffrey) died whilst being held in custody by John at Rouen. One account describes Arthur's death at the hands of John who was not behaving rationally at the time (see Sections 5.4.3 & 5.5).

Several events in John's reign are associated with the presence of large amounts of alcohol, of which it is assumed he consumed his share. Moreover, there is some evidence of alcohol precipitating low periods (May-Aug1201) and excessive alcohol during a high period (Oct 1203) (see Sections 5.2 & 5.5).

### **7.1.8 Psychological/Psychiatric history**

- **Personality & Creativity**

Evidence of neuroticism or reward dependence is difficult to obtain from contemporary records. John was conscientious and persistent in some matters but only at times that suited him e.g. legal activity. In taking swift military action on Mirebeau and undertaking sea crossings in the winter, John cannot be accused of harm avoidance (see Section 2.3.6).

John's creativity is perhaps evidenced by his use of carts to transport the prisoners from Mirebeau, which according to Wendover was a new and unusual form of transport (*novo genere equitandi in inusitato* (Coxe, 1841)p169.). Also of note was John's novel use of a dressing gown during the customary break between first and second sleep, and for which the clerk had no name but could only describe by function: *ad supra tunicam domini Regis ad surgendum de nocte pro manum Williami cissoris, XXs* (for the King's overgarment when he rises at night, handmade by William the tailor, 20 shillings. my translation ) (Hardy, 1844)p15,1(Ekirch, 2001) Further details are found in Section 2.3.6

- **Relationships**

John's administration had a number of longstanding members of court who were consistently loyal to him. Many of them held their positions by reasons of merit rather than birth and originated from Tourraine and Anjou, which to both the English and the Normans were considered to be foreign. Those that lived at the edges of the Plantagenet sphere of influence – his Poitevin subordinates and the Scots, Irish and Welsh – repeatedly tested his royal control to gain political advantage and assert their own local dominance. In contrast the Normans only switched allegiance from their Duke (John) to the French crown when their defence needs were ignored and French conquest became inevitable. Likewise most of the English establishment continued to support John albeit reluctantly at times and even to the point of creating a novel written contract between ruler and subjects: *Magna Carta*. Only when this last option was rejected by the Pope, acting as a higher, external authority, did the English barons withdraw their support *en masse*. By 1216, this even included his natural brother, William Longsword.(Warren, 1978) See Section 2.3.6 for further information.

- **Leisure activities**

Like many of his rank and culture, John enjoyed hunting, gaming and chess. He also travelled with a small collection of books and paid repeatedly for the luxury of baths.(Warren, 1978)p140, (Hardy, 1844)pp 115,137.

- **Prevailing mood**

John's mood was changeable e.g. with the same applicants, on one occasion, he showed rage and intolerance, while at another time, tearfulness and penitence. If his travelling was a marker of his mood, then high mood predominated over low mood. (45.6% high vs. 13.7% low, days of reign) (see Sections 4.3.2 and 4.4).

- **Character & Attitudes**

John appears to have repeatedly placed his trust in the power of legal instruments such as treaties and from this arose his contemporary epithet: Softsword. (Powicke, 1913)p133, (see Section 2.1) He was not immune to the needy, repeatedly providing poor relief after bad harvests.(Jolliffe, 1963)p20. However his institution of handing out Maundy money, on the anniversary of Arthur's death may have had greater personal symbolism than the formal recognition of poverty by power (see Section 5.4.3).

John appears to have differentiated between personal piety and the Church establishment. In 1200 he endowed Beaulieu to be his final resting place and made conventional religious statements in his last testament in 1216. Despite the rise of heresy on the continent and the ensuing Albigensian Crusade (1209–1229), those areas under John's rule were seemingly unaffected and he even gave financial support to those sympathetic to the Cathars who fled the conflict, such as Raymond of Toulouse.(RaymondVIToulouse) In addition, like most West European rulers since the time of Emperor Henry IV and the snows of Canosa (1077), and like his father before him, John continually pushed to stretch and define the interface between temporal and spiritual control. (Warren, 1978)

His loyalty to those who served him was not constant – he ransomed some (Fitzwalter, de Quincy and Gerard d'Athee) but left other equally loyal supporters to their fate (Roger de Lacy in Gaillard).(Warren, 1978) Unique among his relationships was the breakdown of a formerly close and longstanding relationship between John and de Braose as a result of something said publically about Arthur's death.(Warren, 1978)

In contrast perhaps, John indulged his young wife; provided for his former wife; ensured that Eleanor of Brittany (Arthur's sister) had her creature comforts, and sent presents to his mistresses. This consistency transcends sexual favours and would appear to be more than just chivalry in his treatment of Eleanor and his former wife: perhaps he found the traditional male donor/female recipient relationship less threatening and easier to control. Alternatively, having been brought up at Fontevraud, with its unusual women-led organisation, it may be that he had greater instinctive understanding of female needs and aspirations, than he had for his knights (see Section 5.2.3).

- **Habits**

John had some regular habits, although these may also reflect the priorities and organisation of his court. He always celebrated Easter, but did not particularly observe Sunday as a day of rest nor did he prioritise Christmas. He tended to start his major journeys late in the week (Wed- Fri) after spending the preceding weekdays on administrative functions. He travelled mainly in summer,

often in winter and least in spring. Evidence from England, suggests that he stayed predominantly on his own estates or at royal castles (see Section 3.3).

### **7.1.9 Investigations**

The methodology that identified the high and low periods (CPA) was investigated by testing the methodology and then applying it.

#### **Testing CPA**

1. The significant changes in John's travelling activity were tested and found to be independent of the pattern of the available historical sources. The influence on CPA of the no-record days – where John's location is not recorded in the itinerary – was small.(see Sections 3.3.1, 4.3.1 and 4.4)
2. Testing the intraperiod duration and the rapid cycling years was inconclusive, because some periods were driven by circumstances, rather than possible bipolar disorder, and this confounded the results (see Sections 4.3.2, 4.4, Chapter 6 and Appendix 9). Despite this confirmed influence (see 2 below), the results did not contradict a diagnosis of bipolar disorder. In contrast, the analysis of seasonality matched that described by the literature on three counts – the general annual trend, and specifically for both mania and depression (see Sections 2.3.7, 3.3.2 and 4.3.2). (Eastwood and Peter, 1988, Cassidy and Carroll, 2002)
3. The changes in travelling activity were matched by with similar changes in other activities i.e. legal work and administration (see Sections 4.3.3 and 4.4).
4. A comparative mathematical model (Bollinger Bands™) also identified polar changes that exhibited some temporal similarities (see Sections 4.3.4 and 4.4).
5. Testing John's travelling changes against a familial and non familial comparator showed a possible difference between John and the non-familial subject, and a similarity with the familial example (see Sections 4.3.5 and 4.4).

#### **Applying CPA**

1. The study used the CPA periods to investigate the temporal relationship of the contemporary descriptions of possible bipolar symptoms and the periods. This showed an overwhelming concordance between possible bipolar symptoms and CPA polarity, whether manic or depressive (see Chapter 5). It is hard to explain these concurrences in any other way than in support of the diagnosis of bipolar disorder.

2. The likelihood that some of the identified changes in King John's travelling activity could have been driven by external circumstances was also tested. The study used a representative sequence of CPA periods (Yrs 1200 to 1203) and the contemporary primary sources relating to them, and found that over half the identified travelling periods demonstrated plausible circumstantial reasons and no evidence of bipolar behaviour. Low periods were three times more likely to show evidence of being driven by circumstances, compared to even odds for high periods. These findings confirm the study's previous interpretation regarding the analysis of intraperiod duration (see 2 above). Yet despite this, all the bipolar evidence found by this method matched the polarity of the synchronous CPA period. Such a pattern of concordance is highly unlikely to have occurred by chance and adds weight to the diagnostic evidence (see Chapter 6).

#### **7.1.10 Summary, Differential and Working Diagnosis**

In summary, this is the medical history of a Caucasian man during his thirties and forties who exhibited actions or inactions that were incomprehensible to onlookers and who was also inconsistent in his behaviour. Bipolar disorder has already been suggested as a likely diagnosis.

The evidence presented for mania meets the ICD-10 diagnostic criteria and accounts for nearly half the days of his reign (45.6%) However, since no evidence is presented of either "depressed mood" or "loss of interest" during low activity periods, the diagnostic criteria for depression cannot be fulfilled. The medical history describes 8 additional bipolar behaviours that add weight to the evidence for bipolar disorder. They too relate predominantly to mania but also include some relating to depression. Both mania and depression demonstrate diagnostic stability, where symptoms either occur during one polarity or the other, but never both.

Evidence from the natural history of the changes in John's activity, both on a daily and yearly basis, shows comparable changes to that published for bipolar patients. Switching was identified and the suddenness of his behavioural changes was specifically noted by one contemporary writer. The presence of excessive alcohol was associated with switching from high to low travelling activity and administration. The pattern of his seasonal activity matches that described in the bipolar literature, not only in the differences between seasons but in the pattern of high and low activity during each season.

John's medical history confirms that he was inconsistent in both his work related functions and in his personal interactions. It further notes that he was creative in solving problems; that he had access to significant quantities of alcohol; that he had sexual alliances that challenged the cultural norms, and that he was accused of homicide, at a moment in time when others considered him to

be behaving irrationally. Despite such implied variability, he established some regular habits such as his observance of Easter.

John's family history describes a father who was very active and rather erratic. It identified both paternal and maternal ancestors who had presentations suggestive of bipolar disorder.

- **Differential Diagnosis**

In addition to bipolar disorder, alternative or differential diagnoses would include alcohol misuse, seasonal affective disorder, or intermittent physical illness e.g. infection. Personality disorders and chronic physical conditions can be excluded as candidates as they have little variation in presentation and would therefore not explain the presenting symptom of inconsistency, nor the statistically significant changes in activity.

Intermittent alcohol misuse, leading to low periods of administration and activity, superimposed on a familial tendency of erratic, high activity, could account for some of the study findings. However, it would be highly unlikely that contemporaries would not have made some mention of this, especially as, for example, the Cistercian Abbots quoted the king's speech during his interaction with them, and they would have recognised if he had been drunk (Nov1200). Instead, on a number of occasions, they expressed their puzzlement or attributed the king's actions/inactions to enchantment or Divine intervention (see Section 5.3.2). Equally, although alcohol played a role in King John's condition, as is common in patients with bipolar disorder, it is not a likely alternative primary diagnosis.

Seasonal affective disorder (SAD) superimposed on a familial tendency of erratic, high activity might account for some of the findings, especially since it is conflated in the pre 1984 bipolar literature (see Section 2.3.7,p33). However, second only to the distance travelled in summer, John travelled extensively in wintertime, when SAD has its greatest effect. Equally, periods of low activity were found during summertime. In addition, SAD does not explain the sudden switching in activity levels (see Section 3.3.2).

Intermittent physical illness, superimposed on a familial tendency of erratic, high activity might explain some of the findings, especially since infections were, and are, common and recurrent. It is postulated that the Medieval Warm Period may have allowed malaria to become endemic in England but the evidence is weak before the 14th century. Whichever the infective agent, as with alcohol, it is unlikely that contemporaries would not have been competent to write a description of John's symptoms and inexplicable that they would have avoided doing this.

- **Working Diagnosis**

Ninety years ago, bipolar disorder was suggested as an explanation for John's presenting symptoms. This medical history of John has found additional evidence in its support, and little to suggest a viable alternative, so that bipolar disorder remains the working diagnosis.

## **7.2 Study Limitations**

It is customary practice in scientific publications to summarize the limits of the methodology and draw attention to where care should be exercised in the interpretation of the results. This also defines the study boundaries or limitations, and sets the work within its wider academic context.

- **Principles**

The study is limited by the 800 years that has elapsed since the events because, as a post mortem investigation, it is not able to interview the subject, nor his observers, and must rely on general purpose documentation rather than medical records. This documentation contains mainly hearsay evidence and, although a measure of accuracy was established for one source, this does not exclude *post hoc* reinterpretation. Modern evaluation may also be influenced by the retrospective application of current cultural norms and values. Equally, the diagnostic process is by nature one of uncertainty, irrespective of circumstances, with confirmation often following the subject's response to medical intervention. That option is not possible in this case.

The use of the scientific format may obscure as much as it illuminates in an interdisciplinary investigation. The medical model of aetiology carries a cognitive bias, and follows a heuristic pathway to create a diagnosis.

The diagnostic guidelines are predicated on being able to interview the patient e.g. the first tier criteria for depression requires identification of *depressed mood* and *loss of interest*. In addition, older bipolar literature is confounded by the inclusion of subjects with unipolar depression and until 1984, also by Seasonal Affective disorder. The debate continues over the significance of premorbid personality or whether personality changes arise from the effects of bipolar disorder, making its evaluation difficult.

- **Measurements**

All physical measurement is a compromise between accuracy and scale, and the study's choice of Euclidean distance introduced an error, albeit a standard one. Equally, although the moderation of time makes longer journeys more believable, it over-moderates smaller journeys and when

journeying occurs on a daily basis. Although most locations were readily identified, the identification of a few was made on the balance of probability. These allocations may be revised by future research and this may in turn, alter the results of the primary Change Point Analysis.

- **Methodology**

Change Point Analysis (CPA) is an established methodology although, to my knowledge, this is the first time it has been used in a psychiatric context and has therefore not been validated for this use.

The use of Bollinger Bands™, predicated on the constancy of human behaviour at its most basic level, is also both novel and consequently not yet validated. The comparison between methods showed that Bollinger Bands™ identified a larger number of changes in travelling activity (185 BB™ periods vs. 83 CPA periods). This suggests that it has either a greater sensitivity than CPA, or that volatility and activity are different parameters, or a mixture of both.

The time series requirement for imputation modelling introduced a standard error and an imperfection that was demonstrated by the inability of any of the models tested by the study to identify all the historical bench markers.

The application of clinical definitions, and inclusion and exclusion criteria, was a selection process that restricted the evaluation of the complete data, although this was addressed by the analysis in Chapter 6. The inclusion of periods of change that started on the 1st January or ended on 31 December may have introduced a source of analytical error. The statistically representative sample used in Chapter 6 provides an incomplete historical account by dealing only with Yrs1200-1203, although this does not invalidate the comparisons made within the analysis.

- **Results**

Change Point Analysis accounts for only 91.8% of the days of King John's reign as no changes were identified in 1199 or 1209. The study did not demonstrate convincing evidence of a consistency of duration of the bipolar intraperiod, although this finding was shown to have been confounded by changes in activity arising from circumstances. Similar difficulties in interpretation may be seen in the analysis of rapidly cycling years. The study did not find a significant association between travelling activity and changes in alms giving in lieu of religious observance, although this is likely to have been because of statistically small numbers. The results of the comparative analysis of the itineraries of King John and his brother Richard, and of Peter des Roches, were confounded by a number of variables – Richard's itinerary covers a different period of time and shows high uncertainty (no-record days) and although Peter des Roches' itinerary shows a high concurrence with King John in place and time, it also demonstrates a high uncertainty outside these periods.

Four of nine symptoms of mania and six of ten symptoms of depression, were not identified. Most of the corroborative evidence for depression was found in the early years of King John's reign, perhaps because of the greater number of sources writing during this time compared to later in his reign. It may also reflect a study bias by the submission following its more detailed exploration of the early years for the analysis of Chapter 6. The identification of all the symptoms was influenced by the cognitive bias that followed knowledge of Dutailis' bipolar thesis and by the author's clinical bias. The interpretation of some, such as the Delusional Misidentification syndrome, might also be regarded as an extrapolation too far.

The historical evaluation of Chapter 6 and Appendix 9 was constrained by the boundaries imposed by *acts of commission* or *omission* and the latitude granted by the subjective assessment of *behaviour that is difficult to explain*. The evaluation was also limited by only considering a sample of a reign that was notable for its events: those leading up to *Magna Carta* and the baronial rebellion may for example, produce different findings. The diagnosis of bipolar disorder might be challenged by the finding that low periods were three times more likely to arise from circumstances than possible bipolar causes, especially since the diagnostic evidence for depression cannot comply with the ICD-10 criteria.

### **7.3 Future work**

#### **Medical Aspects**

This study has used King John's travelling activity and mathematical modeling to identify significant changes, as a diagnostic marker of bipolar disorder. Extending this principle to current practice, both numerical methodologies (CPA and BB™) offer a means of assessing activity over time, rather than using the traditional word or concept based analyses. Further, "*changes in activity*" is an objective parameter that is readily measured in both clinical and research scenarios.

Change Point Analysis is a robust methodology that is applicable to future research using different historical parameters in other suspected historical subjects. (Professor Timothy Peters, personal communication 21Dec 2015) It is also a transferable methodology both as a clinical monitoring tool and a research endpoint, and applicable to all time-based medical investigations. As a research tool, it not only identifies change on a named day basis but also the scale of change and could therefore be used in clinical trials for the evaluation of therapies and of prophylactic agents. Specifically, it might provide new insights into the debate over the effectiveness of lithium in preventing relapse and the efficacy of mood stabilizers. (Shorter, 2009, Glen et al., 1984)

The study also raised other questions about current views of bipolar disorder and its diagnosis. For example, although there is an undoubted inter-relationship between alcohol and bipolar disorder, the literature describing the risk of precipitating a switch from mania to depression by excessive drinking during mania, remains elusive. This merits investigation as a potential marker of incipient bipolar change, similar to the changes seen following disruption of the circadian rhythm. Equally, there appears to be an innate flaw in using behavioural parameters to assess the personality characteristics of bipolar patients when the same parameters are directly changed by bipolar episodes. If personality investigation is not possible without behavioural parameters, then the bipolar status at interview should at least be recorded and its bias included in the analysis. Likewise, the first tier criteria for depression which requires *depressed mood* for its diagnosis is a circular argument and differs from the objective criteria for mania.

Volatility is a term frequently used in, but not defined by, the bipolar literature. Using Bollinger Bands™, this study appears to have shown that volatility can be statistically quantified and that it appears to be distinct from activity, although the method is as yet unvalidated. By having a means to monitor volatility, future research could investigate its underlying biochemical mechanisms which could become targets for pharmacological interventions. With the plausible association of increased suicide risk during high volatility and low activity/mood, this new ability is not only of clinical interest but could also be used to evaluate new regimens and therapies targeted at suicide reduction.

### ***Geographical aspects***

The study demonstrates the statistical constancy in the distribution of travel time despite the passage of eight centuries, changing transport technology and better road quality. This raises fundamental questions such as, *what are the constraining variables that govern human travelling?*

The use of moderation in travel time may alter our understanding of other itineraries irrespective of era. In addition, further work relating journey routes to the physical geography would shed light not only on the high levels of travelling during winter but the lowest levels during spring time, when lower ground might have been boggy and rivers in spate.

The gazetteer provides a replicable means of identifying the locations of King John's itinerary and should also enhance the accuracy of online maps relating to King John's itinerary, such as in the study's current collaboration with Jon Crump at [www. neologography.com](http://www.neologography.com). (Crump, 2015) Some of the "problem places" deserve further investigation, either from historical sources or from archaeological investigation, as this will not only provide greater accuracy but additional insights about King John's court.

Further investigation might also explain how communications were updated between court and messenger e.g. how the messenger tracked court progress to find the king. Relating to this, some of

King John's long distance journeys appear to be following a bearing, in effect travelling the Euclidean route, for example Doncaster, Bolsover and Derby (28 March 1200) or Dol; Mortain; Bois and Falaise (19 Sept 1203). This is not entirely unrealistic in an unenclosed landscape, and both the theory and technology for such navigation was available to King John. For example, the mathematical basis for latitude and longitude had long been established: Khwarazmi (780-850AD) had used it to pinpoint 2,402 locations and his new maths had been brought to England and translated by Adelard of Bath (1080-1152) two generations previously. Robert Grosseteste, the polymath of Hereford, was a contemporary of King John.(Starr, 2013)p167,(Southern, 2010) In addition, King John was accustomed to sailing and northern sailors used a magnetised compass.(Neckam, 1863, Johnson and Nurminen, 2007)p155. Given that there does not appear to be a financial audit trail for the payment of guides, could it be that King John and his *mesnie* used bearings to navigate across country, and that the messengers did likewise?

### ***Historical Aspects***

The study has found that the current view of "Bad" King John is based on an incomplete account, such as the apparent lack of any published reference in modern texts to King John crying and to his grieving. This has arisen in part from the unfinished work of translation of the primary sources which creates an unnecessary barrier to open access and to investigation by the wider academic community. With worldwide reference to *Magna Carta*, translation and publication would fulfil its tradition of fair judgement and democratise this pivotal fragment of Western European history; with online access to crowd sourcing, it would neither be impossible to achieve nor implausible to set adequate academic standards.

Future work on the evidence from crown wearing, alms giving in lieu of religious observance and other countable parameters such as gaming losses or wine purchases might not only add to the debate about bipolar disorder but increase our understanding of life at King John's court.

Finally the study suggests that two global issues relating to historical investigation appear to have been overlooked. The first considers the plasticity of human memory which Holt evidences when he says that

*"there can be no doubt that time told against John's reputation... Rigord's first version [1196]... is quite neutral ... up to 1206 preserves this atmosphere... At this point William the Breton took over and... between 1214 and 1227 ... the creditable story is suppressed and John is already presented as treacherous."*

*(Holt, 1963) p22*

This is much more than simple *post hoc* revisionism: recent work from psychology shows that eyewitnesses modify their testimony to make it coherent with their current reality and if challenged, will genuinely deny any conflicts found in their contemporaneous account.(Anderson, 1995) This consistent human bias poses questions not only for legal practice where it is currently being explored, but also for historical investigations and their interpretations.(Engelhardt, 1999, Heaton-Armstrong et al., 2006)p12. Moreover, and in contradistinction to written cultures, it may be that accuracy of recall is better in oral/aural cultures because of the value given to the individual words rather than just their message, in the same way that adults can accurately recite poetry learnt by rote in childhood.

Secondly, there is the presumption of sanity, as for example in the interpretation of the poetry of William IX of Aquitaine. Whilst it is accepted that the majority of the population do not have psychotic mental illness, a small number do, and this study has shown that, for bipolar disorder, this proportion should be no different in the global historical population. Indeed it could be argued statistically that, with its association with leadership, there are not only too few historical accounts where bipolar disorder has been recognised, but that there should be even more representatives in world history than one in every hundred.

#### **7.4 Conclusions**

In weighing up its evidence, the study has found additional support for Dutailis' thesis that King John's conduct was suggestive of bipolar disorder, that the malady was recognised by his contemporaries, and that there was a family history of similar behaviour. It has demonstrated descriptions of behaviour where King John was

*... predominantly exalted and cheerful, influenced by the feeling of heightened capacity for work. The patient is in imperturbable good temper, sure of success, "courageous", feels happy and merry, not rarely overflowing so.... On the other hand there often exists a great emotional irritability. The patient is dissatisfied, intolerant, fault-finding... he becomes pretentious, positive, regardless, impertinent and even rough, when he comes up against opposition to his wishes and inclinations; trifling external occasions may bring about extremely violent outbursts of rage.*

*(Kraepelin, 1921)loc 1118.*

and other times when he was

*...dull or stern, dejected or unreasonably torpid, without any manifest cause.... Unreasonable fear also seizes them ... They are prone to change their minds readily; to become base, mean spirited, illiberal...*

Aretaeus quoted in (Goodwin and Jamison, 2007)loc2718

It has used mathematical modelling to evaluate statistically the changes in his behaviour and by rebutting three null hypotheses, each in turn, can say that:

1. *King John of England does show changes in his travelling activity that would be expected in bipolar disorder in that*
  - *periods of high and/or low travelling activity demonstrate features that characterise bipolar disorder periods.*
  - *comparable high and/or low activity is found in other activities carried out by King John*
  - *periods of high and/or low travelling activity are demonstrated by an alternative mathematical model*
  - *comparable high and/or low travelling activity is found in either familial or non-familial comparators.*
2. *there is historical corroborative evidence of bipolar disorder symptomatology associated with periods of significant change in King John's travelling activity.*
3. *there is historical corroborative circumstantial evidence of bipolar disorder associated with periods of significant change in King John's travelling activity.*

From this, the study echoes Hazlitt's sentiment that "*[t]he crimes he [John] is tempted to commit are such as are thrust upon him rather by circumstances and opportunity than of his own seeking*" while not denying the unpleasantness of their outcomes which Hume terms "*such general terror*".(Hazlitt, 1817)loc 2760,(Hume, 1754-62)loc 6713. However it contests the opinion and influence of William Stubbs, and rejects his moral condemnation, when he says that "*there is nothing in him [John] which for a single moment calls out our better sentiments.*" (Stubbs, 1873)p xi.

It will be argued no doubt, that although the symptomatic evidence meets the ICD-10 diagnostic criteria for mania, it does not and indeed cannot, meet the criteria for depression, as the first criteria demands a "*depressed mood to a degree that is definitely abnormal for the individual, present for most of the day and almost every day, largely uninfluenced by circumstances, and sustained for at least 2 weeks*". (ICD-10, 2010) However, this is tantamount to *circulus in probando* or circular logic and is also somewhat paradoxical since at least one key crisis of King John's reign – the loss of Normandy – resulted from his physical inactivity and his political inaction. Equally, it flies in the face of the weight of evidence for both mania and depression found in Chapter 5: the number of bipolar-type symptoms and the consistency of their presentation within CPA periods. Likewise from the circumstantial evidence of Chapter 6, although the quantity of bipolar evidence was biased towards the high periods, with only 25% of low periods showing evidence of depression, the quality of the symptoms described for both mania and depression and their concurrence with CPA periods of appropriate polarity, is highly supportive of the diagnosis. Further, this takes no account of the adage from journalism that says, "*no news doesn't fill column space*" and which suggests that if King John was doing and saying very little, there would be very little reported by the primary sources,

unless it was overtly inexplicable. This lack of evidence for depression matches the clinical experience, where 28% of white Europeans who present during their first manic episode had a prior history of having had one or more episodes of depression, suggesting that depression is more easily overlooked, or tolerated by others, than mania.(Kennedy et al., 2004)

The diagnostic process has evolved to meet the pragmatic necessities of clinical practice. By definition, it accommodates uncertainty as much as it dispels it: it can only provide a likelihood or probability of a diagnosis, a situation which is as true for modern patients as for late medieval kings. This means that we can never know for certain if King John had bipolar disorder. However, as a clinician, I would suggest that this study has presented sufficient evidence, of quality and in quantity, to make the medical diagnosis, with the burden of proof if anything, exceeding the balance of probabilities. This provides a unitary, coherent and inclusive reason for those inconsistencies of leadership and vagaries of character that were exhibited by King John.

Moreover, and irrespective of whether my conclusion is accepted, the possibility of bipolar disorder must now be given due consideration and a fair hearing. The question "*Was King John of England bipolar?*" cannot now be summarily dismissed as "*tainted testimony*", not least because all human testimony contains biases. Equally, it also raises questions about the general presumption of sanity in the interpretation of history and it would appear, of literature.

Together, this will change our interpretation of King John – the man and his moment – and by implication, of *Magna Carta*. This English touchstone has traditionally been viewed as the measured, even magnanimous, response of the barons to royal tyranny. As a list of remedies for grievances it is not unique but remarkable in showing how the barons sought to ensure the stability of their society by shoring up the monarchy, even if not entirely supporting the monarch. However, it was condemned by the Pope because among other things, Clause 61 imposed a supervisory Baronial Council of Twenty-Five to monitor King John's compliance.(MagnaCarta, 1215) This clause is found in the first issue of *Magna Carta* and then discarded in later editions, suggesting that it was personal to King John and particular to the prevailing circumstances. If so, and from the findings of this submission, Clause 61 represents a no less remarkable means of managing mental illness in a medieval monarch.

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