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CONTENTS:

EDITORIAL.....	i
OUR FUTURE WORLD(S)	1
<i>LUKE WHITTINGTON, JAMES DOOLEY, AND MARTIN HENSON</i>	
INITIATION INTO ADULTHOOD AND OLD AGE: THE JOURNEYS OF TELEMACHUS AND ODYSSEUS	9
<i>FRAZER MERRITT</i>	
AN ASSESSMENT OF THE DIFFERENCES IN LINGUISTIC NATURE OF PATIENTS WITH BROCA'S AND WERNICKE'S APHASIA.....	17
<i>EMMA WILLIS</i>	
ON THE ROAD TO DEMOCRACY WITH STICKS AND CARROTS. THE RELATIONSHIP BETWEEN MILITARY FUNDING AND DEMOCRATIZATION	23
<i>GEDIMINAS BLAZYS</i>	
ESTIMATING FUTURE STARTING SALARIES: DO ANCHORS INFLUENCE THE RANGE OF VALUES WHICH SEEM PLAUSIBLE?	34
<i>MICHAEL CALEY</i>	

EDITORIAL

We are delighted to welcome you to the first issue of the fifth volume of ESTRO and are proud to continue the multidisciplinary profile of the journal in this anniversary year. As always, ESTRO strives for academic excellence as well as variety, aiming to be more than just a drop-box for Essex research. ESTRO is here to strengthen the academic community by being a resource by and for all students. The articles for this issue were written by authors coming from five different departments, studying at different levels at the University of Essex. They represent an engaging, Essex-flavoured mix of theory and practice, language and analysis. We are confident that each article is interesting, enlightening or even inspiring to people within *and* beyond their subject areas.

We start with an article from Luke Whittington, James Dooley, and Martin Henson, presenting current research done on intelligent environments, where the University of Essex pioneers new approaches to scaling up artificial intelligence to enhance and transform our every day environments. Continuing with a radically different kind of transformation, Frazer Merritt guides us through the psychological journeys of two characters in *The Odyssey*. The last three articles of this issue represent a thorough introduction to important academic work being undertaken across our University, from statistical analysis to conducting experiments and testing theories. Emma Willis investigates the difference between two variants of aphasia, a class of language disorders, based on experiments found in critical literature. Using statistical regression, Gediminas Blazys investigates the relationship between military funding and the level of democracy in countries. The final article of this issue is a lab report by Michael Caley, examining the influence of contextual anchors on undergraduates' financial judgement.

This issue of ESTRO opens with an article that presents fascinating research that is being conducted at the University of Essex right now. Luke Whittington, James Dooley, and Martin Henson introduce us to projects in artificial intelligence and intelligent environments, promising a world of enhanced experience that does not seem far removed from science fiction. In 'Our Future World(s)', the reader is introduced to Intelligent Environments: an area of research aimed at the augmentation of people's lives and experiences. This is done by virtue of artificial intelligence embedded in classrooms, offices and homes, designed to make life easier. Within the field there are still some issues to be resolved, and the University of Essex

is doing pioneering work by coordinating research into Intelligent Environments and driving it forward. The article is an excellent example of how technological change is slowly but surely transforming our way of life – concepts that seemed fantastical in the past now seem reasonable and even achievable.

In line with Whittington, Dooley, and Henson's essay, Frazer Merritt's article, entitled 'Initiation into Adulthood and Old Age: The Journeys of Telemachus and Odysseus' discusses a transformation taking place. Instead of looking at the changes that are being made to our environment however, he pictures the psychological journey of two characters of Homer's classical tale *The Odyssey*. On the one hand, Telemachus, in the absence of his father, must proceed from adolescence to adulthood, taking up his responsibilities and identifying with the archetypal warrior. Odysseus, on the other hand, having fought in the Trojan War for ten years, which is symbolic of the goals and ambitions of the middle age of a man's life, needs to acknowledge that he is passing into old age by overcoming the temptations of the Sirens and goddesses on his way home. Merritt's psychoanalytic interpretation of a particular theme present in this age-old story offers a fresh perspective on what is involved in the transformation of the masculine subject throughout his life.

Passing from literature to language, Emma Willis's 'An assessment of the differences in linguistic nature of patients with Broca's and Wernicke's aphasia' is an essay that involves a very different aspect of academic research: conducting and interpreting research. Discussing the long road of medical and psychological research and experiments concerning aphasia, a class of language disorders usually associated with brain damage, this essay meticulously characterises and categorises the symptoms involved in two variants of aphasia. While at first glance they seem similar, this essay concludes that Broca's and Wernicke's variants of aphasia have distinct and explainable differences in their linguistic symptoms.

Related in comparative approach but not methods, Gediminas Blazys's essay titled 'On the Road to Democracy with Sticks and Carrots. The Relationship between Military Funding and Democratization' looks at two competing theories of budget allocation. Specifically, this essay considers the link between military funding and democratization, as well as the mechanisms underlying this effect. Should countries aiming to democratize increase military funding in order to appease, or decrease funding to limit military power? Gediminas's essay is a compelling read, combining statistical regression analysis with the two existing theories in order to compare the empirical evidence in favour of both theories.

Finally, we have a lab report from Michael Caley bridging finance and psychology, ‘Estimating Future Starting Salaries: Do Anchors influence the Range of Values Which seem Plausible?’ This report analyses three different ways in which numerical anchors might nudge people into giving biased estimates of starting salary. Using statistical regression analysis and data gathered from his own experiments, Michael’s findings not only chime with the relevant literature of the field, but also provide new insights into the ways people are influenced towards higher or lower estimates.

We hope that you will enjoy reading this issue as much as we enjoyed editing and compiling it. We also want to encourage all students at the university to submit their best work to us. ESTRO is a student-run journal, and we rely entirely on students who are interested in publishing or reviewing for ESTRO. As such we would like to thank everybody who contributed to the journal, especially the authors and reviewers, for their hard work and dedication.

Goedele Caluwé and Daan de Lange, Editors

Our Future World(s)

Luke Whittington, James Dooley¹ and Martin Henson¹

ABSTRACT

The idea of having the environment around you adapt to your presence is one that has long existed in science fiction. Research in Intelligent Environments is starting to realize these early visions. In this paper, we introduce what an Intelligent Environment is, the state of the last 10 years of research (in particular at the University of Essex), the problems arising from the current implementations, and its future direction.

“The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it” – Mark Weiser. This is one of the most oft used quotes within ubiquitous computing research, which is also known as pervasive computing. It is a paradigm whereby computational power is not centralized but rather spread across a plethora of devices, sensors and actuators that are embedded into the fabric of our world. For many years now, ubiquitous computing research has aspired to augment the world around us with technologies that recede beyond human perception into the background of our everyday lives (Weiser, 1991; Milner, 2005). It is only now that the ideas and works of early visionaries are being brought to life through advancements in technology and social acceptance. Technology is so prevalent in modern culture that it “becomes an inseparable part of our lives, but is so embedded that it disappears” (Fox, 2006). This omnipresence of technology is not only restricted to the physical world. With the move towards ‘the cloud’² and the increasing popularity of smartphones, our entire digital lives follow us around. Presently, and as a consequence of making technology invisible, the overall challenges (Satyanarayanan, 2001) still fall short of the promised utopian vision which we see in science fiction. It was foreseen that both the physical and virtual worlds would intertwine seamlessly, reliably and in an unobtrusive manner (Weiser, 1994). While this vision has yet to be realized, it provides an exciting area for research, especially when we consider imbuing this vision with ambient intelligence (AmI) (José, 2010).

¹ Members of staff; without their existing work and patience with me, my research would not be possible.

² Cloud computing is a marketing buzzword for scalable server architecture. End user should not be concerned with the implementation, but rather the services provided.

What is an Intelligent Environment?

Intelligent Environments (IEs) is one area of research that has yielded particularly exciting results. The University of Essex has created two purpose built IE *‘living-labs’* - the iSpace and the iClassroom (Dooley, et al., 2011a; Dooley, et al., 2011b) - which are maintained by the Intelligent Environments Group (IEG). These IEs contain false walls and false ceilings, allowing devices to be embedded directly into the fabric of the environment (and thus in an unobtrusive manner). IEs can be any space (such as the home or the office) that contains a plethora of embedded computer devices, sensors or actuators, which assist in enriching user experiences. These devices are generally interconnected by a network infrastructure, and are controlled over this network by a set of Intelligent Software Agents. In order to understand an IE better, we can liken it to a human body. The sensors act as the ‘eyes, ears and nose’ of the environment; all the raw input will be via one of these sensors. The Software Agents act as the ‘brain’; making decisions based on the input received from sensors. The actuators are the ‘muscle’; putting the decision made by the brain into motion. The network can be considered as a ‘nervous system’; without it, communication between all the different parts is impossible.

When considering the environment alone, this simile works well, but once we introduce the concept of a ‘user’, it tends to break down. Each IE has its own set of users, with each user having their own user profile, and each user profile containing its own unique set of preferences and applications for that user. An IE is able to recognize human occupants (users), reason with context, and program itself to meet the user(s) needs by learning from their behavior (Webber, 2005). As mentioned earlier, the way these environments adapt to user presence is through the use of Ambient Intelligence (AmI). AmI was developed to be ‘user-centric’ and enforces the ‘user is king’ paradigm (Hagras, 2004; Beyer, 2009) - it is the job of AmI to realize the user’s desires and then act upon it.

The user is given a multitude of options to change the environment to their specific taste. As time goes on an IE will learn the user’s preferences, but when the user enters an IE for the first time they are given a default generic profile that will adapt over time. One such way, developed by Dooley et al. (2011a), is the *‘FollowMe’* Graphical User Interface (GUI). Consider an intelligent environment which is split into zones where each zone contains a networked display coupled with interaction methods (such as touch screens, mice, keyboards etc.). Then consider a user who migrates from zone to zone, while there are methods to detect their movement within these zones. As a user traverses through different zones, a personalized GUI, Figure 1, is shown on the nearest display, with the rest of the displays remaining inactive. The GUI for a user will be following them around – ever present, but unobtrusive. This is just one method of controlling the environment; others include voice control and physical movement detected by camera.

Figure 1 (Dooley, 2011); The FollowMe home menu, showing options available to this particular user.

Ambient Intelligence stems from the Artificial Intelligence (AI) field. AmI is simply the deployment of AI ubiquitously. It grew from the idea of creating automatic environment adaptation – i.e. an environment ‘*adapts*’ through the occurrence of actions without needing explicit user direction. Figure 2 shows an illustrative example of how an Intelligent Software Agent typically works. A Software Agent is connected to the real world through sensors and actuators and typically operates according to one of two ‘modes’: Deliberative or Reactive. The actions that an agent takes have an effect on the world to which it is connected by actuators. A reactive agent is one that makes immediate actions based on input from sensors without any complex reasoning, such as someone throwing a ball at your face; the reaction is to get out of the way of that ball, there is no extra thought required! A deliberative agent is an agent that makes actions after analyzing the input from its sensors and uses contextual reasoning to perform an appropriate action – these actions tend to be more subjective than those performed by a reactive agent. For example, you notice the weather is sunny today; do you go to the park or the beach?

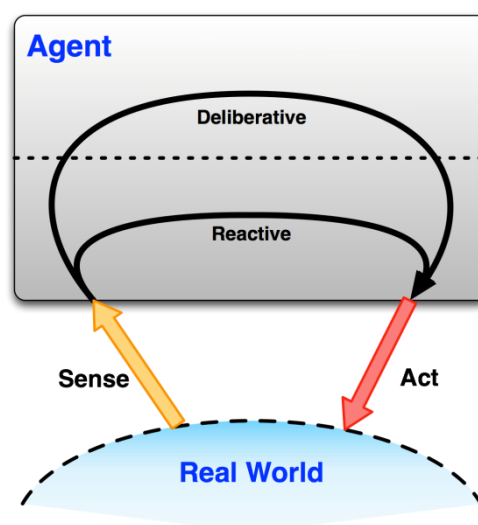


Figure 2 (Dooley, 2012); A software Agent taking input from the real world and creating output into the same world.

The agent's ability to make both reactive and deliberative actions can cause problems. The agent's main purpose is to enhance the user's experience while in that environment, but both the user and the agent can directly manipulate the environment, which can cause 'race conditions'³ that are unsolvable. Consider the following example: Suzanne is a user in the iSpace. She has set up Agent A with a rule that if the external light sensor is reading that it is dark outside, Agent A should close the curtains. It is a particularly hot evening and Suzanne wishes to have the windows open, and thus the curtains open too. She issues a command for the curtain actuator to open the curtains, so the curtains start to open. Agent A notices that it is dark outside and the curtains are opening; well, this is breaking the rule that the curtains need to be closed when it is dark, so Agent A closes the curtains, beginning a never-ending battle between the user and the agent. This violates the IE golden rule – 'the user is king'!

A single environment can have multiple agents and these agents have the ability to communicate with each other. The previous problem does not necessarily require a user's input to lead to race conditions; two agents may have a conflicting rule, which results in an oscillation of actions (such as the curtains opening and closing in an never ending cycle). This is just an example of some of the novel problems that IE developers encounter. These problems get exponentially more complex once the number of users, devices and agents increases.

Describing Intelligent Environments

In Computer Science, Formal Methods is a manner of mathematically describing, modeling and verifying a system. It is anticipated that modeling and verifying systems mathematically will help improve the understanding and robustness of a system (Holloway, 1997). Due to the field's relatively young age, there is a serious problem of fragmentation of research. Different research groups tend to 'reinvent the wheel' rather than work together towards a unified goal. This has resulted in the lack of a standardized formal way of describing these vastly complex systems. This lack of a descriptive language means that each group tends developed their own branch of calculus (Dooley et al., 2012), confusing the matter even further. Traditionally, the methods are mathematically complex, while the examples from which they are built are very simple (Henson, 2012). A Ph.D. in Mathematics should not be a prerequisite when trying to use these languages; a complete understanding of the internal combustion engine is not required in order to drive a car. Part of the author's research is to attempt to bridge the gap between the research groups and solve this complexity issue by creating a standardized description language, tailored specifically for use in IE research. The ultimate aim is to allow different research groups to describe their

³ A race condition may occur when an output depends on the state on an input; when there are multiple, differing inputs, they both "race" to change the output based on their value.

research in a universally understood language, meaning more time can be spent on the actual IE research, rather than on how to describe the research.

Scaling up Intelligent Environments

In their current format, it is anticipated that scaling up the existing implementations of Intelligent Environments will present issues: keeping track of multiple users over a large area, ensuring each of those users has a continuity of experience across the entire environment, and in particular the ‘humanistic’ problem of continually being forced to re-authenticate oneself via entry of username and password. Most computer systems authenticate a user at initial login session (Niinuma, 2010) and IEs conform to this paradigm by using some form of contextual credentials in order to gain access to the assets within that environment. However, while adequate for traditional computing, this creates problems in IEs; it is the equivalent of having to dig your front door key out of the bottom of your bag each time you wish to visit the house, even if you just went into the garden to hang the washing out. It would be ideal for an IE to simply know who to grant access to. This process can be simplified with ‘trusted objects’ (smartphones, RFID tags). We are starting to see this technology emerge in the automotive industry and travel industry (e.g. Oyster cards). Another option is biometrics (using unique human traits for identification) but the technology is not stable enough to be deployed for such a vital use (Giammarco, 2008). These options address the security issue of authentication but do not solve the scalability problems.

In order to try and solve these scalability issues, a dedicated project is being undertaken named ‘ScaleUp’. It is a collaborative research project between The University of Essex and King Abdulaziz University (Saudi Arabia). The aim of the project is to investigate the enabling technologies towards realizing the construction of Large-Scale Intelligent Environments (LSIE) such as an Intelligent building, campus, or town. Dooley et al. (2011b) and Whittington (2012) outline the more technical details of this project. The University of Essex is pioneering the way in this field; creating and hosting the 1st Workshop on Large Scale Intelligent Environments (WOLSIE) taking place at the 8th International Conference on Intelligent Environments (Mexico, 2012). I am very excited to be working in this field at the dawn of this particular line of research; my research is aimed making LSIE architecture a reality!

The big question here is: *‘what is this research is leading to?’* The ideal is an ‘intelligent world’ – a utopian vision where people can roam between IE ‘hotspots’, with no diminution of their continuity of experience. Imagine the following: Faye leaves her home and is automatically logged out of her ‘home space’. Subsequently, her home is aware that there are currently no occupants and enters a power-saving mode and secures all exits. After waiting for the bus for a short amount of time, Faye boards the bus, swiping her watch that registers her presence onboard

the vehicle (her account will be automatically debited once she leaves the vehicle). When she sits down, a context aware display will show Faye's appointments and personalized news ticker, along with the weather. Part way through the journey, the display informs her that she has an inbound chat request from her colleague, Joanne. "*I see you're en-route to work, could you stop off at the corner shop and pick up some milk for the office please?*" – a map appears showing Faye the nearest stop to the shop. As Faye enters her office, she is automatically logged-in to the office space – her cubicle illuminates to her desired light level, the air temperature slightly lowered and her display flickers to life. The first thing she notices is a subtle notification; reminding Faye to put the milk in the fridge. The exciting part of this research is that a vision similar to the one described above is not that far away.

Closing Remarks

While it has been stated that it is natural progression for these environments to start scaling up to monolithic scales, the internals of existing implementations are not perfect and thus still need refining. This work will be taken out in parallel; as the internals of the small environments improve, we can retrospectively apply these improvements to the larger scale environments. With the area gaining so much traction, another aim of ScaleUp is unifying the existing research groups into a single vision, so that we may continue forward together towards a well defined common goal, rather than simply working towards a fuzzy goal that is vaguely in the same direction. In 1959, Arthur Radebaugh started a syndicated Sunday comic, titled "*Closer Than We Think*". This comic painted a technologically rich future, with what seemed like pure science fiction. While we are approximately 40 years late on his predictions, we have made significant progress with Intelligent Environments towards making what Arthur drew in the comics a reality.

Bibliography

Beyer, G. et al. (2009). A Component-Based Approach for Realizing User-Centric Adaptive Systems. *Mobile Wireless Middleware, Operating Systems and Applications*, UCPA Workshop, pp. 98-104.

Dooley, J. et al. (2011a). FollowMe: The Persistent GUI. *First International Workshop on Situated Computing for Pervasive Environments at 6th International Symposium on Parallel Computing in Electrical Engineering*, pp. 123-126.

Dooley, J. et al. (2011b). A Formal Model for Space Based Ubiquitous Computing. *7th International Conference on Intelligent Environments (IE '11)*, pp. 74-79.

- Dooley, J. et al. (2012). The Tailored Fabric of Intelligent Environments. In: Bessis, N. et al. (eds.). *Internet of Things and Inter-Cooperative Computational Technologies for Collective Intelligence*. Springer (s.l.).
- Fox, P. et al. (2006). Will Mobiles Dream of Electric Sheep? Expectations of the New Generation of Mobile Users: Misfits with Practice and Research. *Proceedings of the International Conference of Mobile Business (ICMB '06)*, p. 44.
- Giammarco, K. and Sidhu, D. (2008). Building systems with predictable performance: A Joint Biometrics Architecture Emulation. *Military Communications Conference*, pp. 1-8.
- Hagras, H. et al. (2004). Creating an Ambient Intelligence Environment using Embedded Agents. *IEEE Intelligent Systems*, 19(6) pp. 12-20.
- Henson, M. et al. (2012). Towards Simple and Effective Formal Methods for Intelligent Environments. *8th International Conference on Intelligent Environments (IE' 12)*, pp. 251-258.
- Holloway, M. (1997). Why Engineers Should Consider Formal Methods. *Proceedings of the 16th Avionics Systems Conference*, 1, pp. 16-22.
- José, R. et al. (2010). Ambient Intelligence: Beyond the Inspiring Vision. *Journal of Universal Computer Science*, 16(12), pp. 1480-1499.
- Milner, R. and Hoare, T. (2005). Grand Challenges for Computing Research. *The Computer Journal*, 48(1), pp. 49-52.
- Niinuma, K. et al. (2010). Soft Biometric Traits for Continuous User Authentication. *IEEE Transactions on Information Forensics and Security*, 5(4), pp. 771-780.
- Satyanarayanan, M. (2001). Pervasive computing: vision and challenges. *Personal Communications, IEEE*, 8(4), pp. 10-17.
- Weber, W. et al. (2005). *Ambient Intelligence*. The Netherlands: Springer-Verlag Berlin.
- Weiser, M. (1991). The Computer for the Twenty-First Century. *Scientific American*, 265(3) pp. 94-100.
- Weiser, M. (1994). The World is not a desktop. *Interactions*, 1(1), pp. 7-8.

Whittington, L. et al. (2012). Towards FollowMe User Profiles for Macro Intelligent Environments. *Proceedings of the first Workshop on Large Scale Intelligent Environments (WOLSE), co-located with the 8th International conference on Intelligent Environments 2012*, 13, pp. 179-190.

Initiation into Adulthood and Old Age: The Journeys of Telemachus and Odysseus

Frazer Merritt

ABSTRACT

The journeys of Telemachus and Odysseus in *The Odyssey* portray the two most significant experiences in a man's life — the transformation from a boy to a man after adolescence, and the movement from the accomplishments of middle age into the second half of life and old age. Athena functions as an *anima inspiratrix* who launches Telemachus on his task of discovering his masculine identity by searching for his absent father. A young man's potential must be seen by other men, as done by two of Odysseus' former comrades in arms, kings Nestor and Menelaus; additionally, recognition by the feminine is particularly important, a role performed by Helen. Telemachus must connect to his warrior archetype, which is a powerful force for developing the masculine traits of courage, purpose, focus, and authority, often through physical and warlike actions. Odysseus, on the other hand, has to be stripped of his warrior identity, broken of his hubris, and humiliated by his overindulgence in the realm of the Id. His physical and spiritual reunion with his wife Penelope—attainable only after becoming purified through hardships—symbolizes the development of a man's soul in his latter years.

The Odyssey begins on Mount Olympus, a supernatural realm of beauty removed from the vagaries of weather and time, with the gods having a conversation that touches upon themes that forever fascinate the human mind: fate, the role of the divine in our lives, and divine empathy and antipathy for human suffering. This opening puts the reader or listener into an archetypal domain, quite different from the everyday consciousness of logic and reason, computation and calculation, thereby facilitating a connection to deep unconscious energies.

Zeus functions as a Freudian Superego in his position as the benevolent overseer of the world, a somewhat detached ruler who ensures that it continues in its accustomed manner as he metes out punishment to the disorderly (Austin, 1990). Pallas Athena, in an archetypal role as messenger between Olympus and humankind, is the deity who carries out the gods' directives on earth and interjects herself into mortals' lives. She pleads with Zeus to grant Odysseus freedom from captivity on Calypso's island. A primary function of the Superego is "approval or disapproval of actions ... on the grounds of rectitude" (Brenner, 1974, pp. 111-112), illustrated by Zeus deciding that Odysseus has suffered enough and granting his daughter's request.

Athena then flies down to Ithaca to set in motion two archetypal processes for the ego, as represented by Telemachus and Odysseus: initiation into adulthood and a middle-aged man's journey to discover his soul.

Telemachus' Journey to Manhood

When Athena, disguised as Mentos, enters Odysseus' court, she finds a mob of suitors carousing, feasting, and drinking, disgracing the household and consuming its wealth. Odysseus' son Telemachus sits passively as a powerless boy, his "heart obsessed with grief" (Homer, 1996, 1.133). He daydreams of his father, who represents dormant masculine energies within, the spirit of the inner man who must be brought into consciousness and developed.

Telemachus greets Athena in a completely submissive manner even though she could be yet another parasitic suitor to lust after his mother: "Here in our house you'll find a royal welcome./Have supper first, then tell us what you need" (Homer, 1996, 1.145-146). The title of this chapter is, "Athena Inspires the Prince", and the etymology of the word *inspire* stems from the Latin *inspirare*, which means "to breathe" and is related to the word *spirit* (Online Etymology Dictionary, 2012). Athena functions in the archetypal role of anima as inspiratrix of a male by explaining to Telemachus that his father is alive, being held captive, and will return home (Jung, 1964). Athena signals to the ego, Telemachus, that his unconscious masculine spirit is now to be released. Like a shaman in a tribal society, she is acting as the instigator of the initiation quest into manhood, preparing Telemachus for a new life stage.

From a boy's perspective, the thought of transitioning into a man seems almost impossible, something to doubt: "Mother has always told me I'm his son, it's true,/but I am not so certain. Who, on his own,/has ever really known who gave life?" (Homer, 1996, 1.249-266) Telemachus cannot yet identify with this masculine force, leaving him an incomplete person. Athena tells Telemachus that the trial he must undergo is to voyage to King Nestor and Menelaus, two war companions of his father, in order to seek "news" (Homer, 1996, 1.111) of Odysseus, but the real objective is to connect Telemachus to his father's spirit within. A subsequent trial will initiate him into manhood, which the goddess outlines in direct language: "reach down deep in your heart and soul/for a way to kill these suitors in your house,/by stealth or in open combat./You must not cling to your boyhood any longer—/it's time you were a man" (Homer, 1996, 1.338-342).

Towards the end of the conversation Telemachus says, "You've counselled me with so much kindness now,/like a father to a son." (Homer, 1996, 1.354-355) Upon parting, Athena "left [Telemachus'] spirit filled with nerve and courage,/charged with father's memory more than ever

now.” (Homer, 1996, 1.369-370) Athena as anima and initiator has achieved her objective: inspire Telemachus’ masculine spirit to awaken and further the process of ego development.

The bard in the court begins singing *The Achaean’s Journey Home from Troy*, but Penelope, heartbroken, would rather suppress this memory of Odysseus and demands a different song. Telemachus criticizes her: “mother/ ... why deny/our devoted bard the chance to entertain us/any way the spirit stirs him on?” (Homer, 1996, 1.396-399) In some tribal societies, boys receive a spirit song when they undergo initiation into adulthood, and the *Achaean’s Journey* is Telemachus’ song—the last thing he needs is a doting mother to deny his burgeoning man spirit.

With his newfound masculine energy, he harshly rebukes his mother: “So, mother,/go back to your quarters. Tend to your own tasks,/ ... As for giving orders,/men will see to that, but I most of all:/hold the reins of power in this house.” (Homer, 1996, 1.409-414) This new behaviour leaves Penelope “astonished” (Homer, 1996, 1.415). Telemachus then tells the “insolent, overweening” (Homer, 1996, 1.423) suitors that “Zeus will pay you back with a vengeance” (Homer, 1996, 1.436), which leaves them “amazed” (Homer, 1996, 1.439). Athena’s conversation worked wonders!

Antinous, a lead suitor, senses a change in the prince and tries to tempt him to regress: “no more nursing those violent words and actions now./Come, eat and drink with us, just like the old days./Whatever you want our people will provide.” (Homer, 1996, 2.337-340) But Telemachus, “self-possessed” (Homer, 1996, 2.343) after Athena’s encouragement, verbally assaults Antinous and insists he is now aware of the reality of his life situation, an important milestone in adolescence: “now that I’m full-grown/and can hear the truth from others, absorb it too—/now, yes, that the anger seethes inside me.../I’ll stop at nothing to hurl destruction at your heads” (Homer, 1996, 2.349-351).

A second temptation comes from Eurycleia, the housekeeper who raised Telemachus. After hearing of his intention to leave Ithaca, Eurycleia tells him, in stark language, that the suitors will scheme to kill him and that he shouldn’t “go roving over the barren salt sea” as there is “no need to suffer so” (Homer, 1996, 2.408-409). In tribal societies, the initiation quest often involves considerable physical hardship (Jung, 1964). Regardless, Telemachus decides to continue.

Upon reaching Pylos, Telemachus does not know how to approach King Nestor because “Someone my age *might* feel shy ... / interrogating an older man.” (Homer, 1996, 3.26-27) An aspect of initiation into adulthood is learning how to act in the world and how to interact with people far beyond the familiarity of home, which expands the psyche and leads to self-knowledge. Nestor, known for his “knowledge of the world” (Homer, 1996, 3.278), affirms that Odysseus’ spirit is in Telemachus, helping to forge his fledgling adult identity: “Your way with

words—it's just like [Odysseus]—I'd swear/no youngster could ever speak like you" (Homer, 1996, 3.139-140).

A more significant recognition comes from the king of Sparta, Menelaus, who says, "your parents' blood/is hardly lost in you. You must be born of kings,/bred by gods to wield the royal sceptre." (Homer, 1996, 4.69-71) The king and Odysseus, two comrades on the war fields of Troy, were extremely close and "bound by love for each other" (Homer, 1996, 4.199). Menelaus also shares more attributes with Odysseus than Nestor does. He is a man who has sailed the Mediterranean "amassing a fortune" (Homer, 1996, 4.100), is a teller of wild tales, and his epithet is "warlord" (Homer, 1996, 4.85). Menelaus is the person in the *Odyssey* whose spirit is most like Odysseus'.

The third person to identify the spirit of Odysseus is perhaps the most important: Helen. She uses the prince's name, which the two men did not: "To the life he's like the son of great Odysseus,/surely he's Telemachus!" (Homer, 1996, 4.158-159) It was for her that the Trojan War was fought; it was for her that Odysseus left Telemachus as a babe in Penelope's arms; it was because of her that Telemachus has suffered so. She is the embodiment of the desires and excuses and illusions for which men fight wars. Her recognition, along with Menelaus', gives a considerable boost to Telemachus' sense of self and his connection to his father's warrior spirit.

The individuals Athena sends Telemachus to meet are, in Jungian terms, elements of the archetype of the Warrior, which is an energy that Telemachus needs to develop in order to become a man. The three kings—Nestor, Diocles, and Menelaus—were soldiers at Troy; Pisistratus, Nestor's son, has the epithet "captain of armies" (Homer, 1996, 3.541); and Helen, as an inspiring aspect of the anima, represents that which urges men to risk their lives. The last person Telemachus meets, the fugitive Theoclymenus who had killed a man, is a source of, according to the Jungian Steven Walker (2002, p. 149), the "cruel shadow energies" that the prince will have to draw upon to slaughter the suitors.

Telemachus demonstrates his newfound manhood when returning from Sparta to Pylos. He decides to slight Nestor by not visiting him because he has been instructed by Athena to set sail. He has a mission, a purpose, which formerly was lacking, and, like a man, he knows what is important and what is folly in life: "[Nestor is] old, in love with his hospitality;/I fear he'll hold me, chafing in his palace—/I must hurry home!" (Homer, 1996, 15.223-225) When asked by Theoclymenus about his lineage, Telemachus states, without doubt, "Odysseus is my father" (Homer, 1996, 15.297). Whereas before Athena had to disguise herself as the prince to gather shipmates, now Telemachus commands them, exuding a sense of authority, even calling them "comrades" (Homer, 1996, 15.242), a term used amongst warriors. The travels have helped transform the young prince, but the final trial to adulthood remains.

Telemachus finally unites with an exemplar of his warrior spirit in the form of his father, Odysseus, and after a brief flood of emotion, they start discussing war tactics and conspiring how to bring death to the suitors. Although the prince asserts his manhood, “I’m hardly a flighty, weak-willed boy these days” (Homer, 1996, 16.344) and “the boy you knew is gone” (Homer, 1996, 20.347), others do not recognize it. Athena tells Odysseus, “your son,/as fine a boy as one could hope to have” (Homer, 1996, 20.36-37), and the nurse Eurycleia also refers to him as a boy, “And Telemachus, just now come of age—his mother/would never let the boy take charge of the maids.” (Homer, 1996, 22.451-452)

It isn’t until Telemachus’ “trial by fire”, the destruction of the 108 suitors, has been completed that the prince’s connection to his inner warrior masculine spirit has been forged. As Odysseus, the cowherd, the swineherd, and Telemachus depart the bloodied halls and head off into the proverbial sunset, the prince is referred to, for the first time, as a man: “By now the daylight covered the land, but Pallas,/shrouding them all in darkness,/quickly led the four *men* out of town.” (Homer, 1996, 23.420-423, own emphasis)

Odysseus’ Journey to his Soul

Robert Johnson, the renowned Jungian psychoanalyst, delineated three stages in a man’s psychological development: the unconscious perfection of childhood, the conscious imperfection of middle age, and the conscious perfection of old age (Johnson, 1989). The transition from the second stage to the third is Odysseus’ task as he strives to return home to his wife, Penelope, symbolizing his feminine side and his soul, so he can live out the rest of his days in peace.

Whereas Telemachus needed to venture out into the world in order to forge his identity, Odysseus, having won a victory over Troy, which is symbolic of the goals, ambitions, and accomplishments of mid-life, now needs to extract himself from the world and forego his male warrior identity.

Odysseus is oblivious of his entry into a new life phase upon leaving Troy, and the warlust behaviour and actions that served him splendidly in mid-life will only serve to destroy him. Despite having a ship filled with the booty of the Trojan empire, Odysseus plunders the first settlement he sees; his confused crew ask why they are “sea-wolves raiding at will ... [risking] their lives” (Homer, 1996, 3.82). In a tragically laughable episode, Odysseus has a fallout with Nestor regarding two drunken soldiers, so Odysseus returns to Troy in order to sail with Agamemnon (Homer, 1996).

Letting go of Warrior archetype egotism is a difficult lesson and will require a decade of suffering; it is Odysseus' character flaw. While the previous two incidents had innocuous consequences, the third proves disastrous. In order to trick Cyclops, Odysseus has to suppress his identity, which he does until he is safely in his ship and he reveals that his name is not "Nobody". He boasts, "Odysseus,/raider of cities, *he* gouged out your eye,/Laerte's son who makes his home in Ithaca!" (Homer, 1996, 9.560-563) He cannot contain his Warrior hubris because his name represents everything he fought and suffered for at Troy; without his name, he is a faceless wounded veteran, and his war experience is virtually meaningless. Odysseus' attachment to his hard-won name, so difficult to develop in youth as Telemachus' journey illustrates, leads to Odysseus' trials of initiation: Poseidon vows Odysseus will "come home late/and come a broken man—all shipmates lost,/alone" (Homer, 1996, 9.592-594).

Whereas Telemachus faced only two temptations to remain in the safety and comfort of Ithaca, Odysseus, a full-grown man, is enticed with the platter of the dark desires of the human heart. Similar to Telemachus' temptation to regress to boyhood, the Sirens try to lure Odysseus to live in the past. "We know all the pains that the Greeks and Trojans once endured/on the spreading plain of Troy" (Homer, 1996, 12.205-206). As Bernard Knox explains, Odysseus is a veteran of a ten-year war, and he is on his way back to a society where the new generation knows only peace; no one will understand him (Homer, 1996). The Sirens' island is littered with the skeletons of dead men, and it is in the Underworld where Odysseus could relive the Trojan saga with his fallen comrades. The song of the Sirens is essentially the same song that lured Telemachus to adulthood—the *Achaean's Journey Home*—which was beneficial for a youth, but pernicious for Odysseus, since it is an invitation to live in a previous life phase, a kind of death.

Two other primary temptations appear in the forms of Circe and Calypso, both of whom offer an opportunity to forget his home and Penelope. Circe offers satiation of carnal desires—food and soirees and sex—and Odysseus spends one year in dalliance on her island. His crewmates complain, "Captain, this is madness!/High time you thought of your own home" (Homer, 1996, 10.520-521). Calypso heightens the enticement by offering sex *and* immortality, the chance for Odysseus to lay with a "lustrous" (Homer, 1996, 5.96) and "breathtaking" (Homer, 1996, 5.69) goddess forever. It is fitting she resides on an island named "Ogygia", whose etymology means "primal" (Thornton, 1970, p. 27) —Calypso, in Freudian terms, represents a man's Id, the source of all instinctual urges (Hall, 1954).

The Id's sexual enticement keeps Odysseus on Ogygia for seven years, lured away from a more highly developed soul/anima. He is miserable; he "[wrenches] his heart with sobs and groans" (Homer, 1996, 5.94). A man cannot feel emotionally and spiritually fulfilled by sex alone; higher levels of soul development incorporate a physical *and* symbolic dimension of sexuality. Telemachus was miserable because he could not escape the connection with the mother and

identify with the masculine force within, so Zeus sent Athena to inaugurate the transformation of his psyche. Odysseus is miserable because he has an *overidentification* with his adult masculine energies, making him vulnerable to being captured by the sexual pleasures of the Id and the female as a sex object, so Zeus sends the messenger Hermes to free him from his fixation.

By overcoming the temptations of the Sirens, goddesses, and others while abroad, Odysseus learns to overcome his possession by the Warrior archetype and his identification with it. Whereas Telemachus was desperate to establish an adult male ego, Odysseus is desperate to remove a total identification with it. At Ithaca, he skilfully conceals his identity by dressing in rags and pretending to be a beggar in order to trick the suitors. He chooses to be a nobody instead of a boastful warrior. After Antinous, the principle threat, has been killed, Odysseus unveils himself, for now he is a man who has mastery of his warrior identity and has conquered his hubris.

Free from total identification with the archetypal Warrior energy of his adulthood, so difficult to connect to as a youth as Telemachus' story illustrates, Odysseus is ready to return to his wife. As a mature, accomplished male, he is prepared to engage a mature feminine side in his psyche personified by Penelope (Jung, 1964). Upon entering their sacred bed, they "reveled in all/ the long-for joys of love, reveled in each other's stories,/ ... [and] Odysseus told his wife of all the pains/he had dealt out to other men and all the hardships" (Homer, 1996, 23.343-344; 23.349-350). Penelope provides what the Sirens combined with the goddesses offered: understanding *and* love. At last, Odysseus is made whole, rejoined with his soul, and can live until a "ripe old age" (Homer, 1996, 11.155) in the contentment and grace of 'the perfection of old age'.

Bibliography

Austin, N. (1990). *Meaning and Being in Myth*. Pennsylvania: Penn State Press.

Brenner, C. (1974). *An Elementary Textbook of Psychoanalysis*. Virginia: Doubleday.

Hall, C. (1954). *A Primer of Freudian Psychology*. New York: Mentor Books.

Homer (1996). *The Odyssey*. Translated by E. Vieu. New York: Penguin Books.

Johnson, R. (1989). *He: Understanding Masculine Psychology*. Berkeley: HarperCollins.

Jung, C. G. (1964). *Man and his Symbols*. Garden City, NY: Doubleday.

Online Etymology Dictionary (2012). *Online Etymology Dictionary*. [online] Available at: <www.etymonline.com> [Accessed 12 October 2012].

Thornton, A. (1970). *People and Themes in Homer's Odyssey*. Taylor & Francis.

Walker, S. F. (2002). *Jung and the Jungians on Myth: An Introduction*. New York: Routledge.

An assessment of the differences in linguistic nature of patients with Broca's and Wernicke's aphasia

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ABSTRACT

Aphasia is a disorder of language and speech caused by a brain lesion. After the lesion, usually caused by an accident or stroke, the patient typically has some residual language left, indicating that knowledge of language can be selectively impaired by the location of the lesion. The linguistic properties of words and morphemes lost by aphasics are explored in this assessment, as well as the differences in speech production and comprehension between those who have suffered injury to either Broca's or Wernicke's area.

Aphasia as an impairment of language

Aphasia affects the production or comprehension of speech and the ability to read or write. Caused by injury to the brain, it most commonly occurs after a stroke in older individuals, but brain injuries resulting in aphasia may also arise from head trauma, brain tumours, or infections. It may affect a single aspect of language use, such as the ability to retrieve the names of objects, the ability to put words together into sentences, or being able to read. Aphasia can be as severe as to make communication with the patient almost impossible. More commonly, multiple aspects of communication are impaired, but some channels remain accessible for a limited exchange of information. Goodglass and Kaplan (1983) suggested that subdivisions of aphasia syndrome are based on language output. Fluent aphasics have normal articulation, rhythm of speech, phoneme selection, sequencing and syntax, but sentences are deficient in meaning. Comprehension is typically poor with fluent aphasics, but variables such as the presence of auditory receptive impairments and of impaired repetition exist, depending on the exact site of lesion (Kaplan and Sadock, 2007). Imaging techniques such as magnetoencephalography (MEG) and functional magnetic resonance imaging (fMRI) provide images of the brain 'at work' and have led to the growth in knowledge about physiological mechanisms underlying language. For example, Posner and Raichle (1994) set participants tasks of increasing complexity and used positron emission tomography (PET) to monitor the way in which blood flow changed in their brains. It was found that hearing a rapid sequence of words, shadowing and association all activated different parts of the brain, but were not exclusive to just one area. This suggests that the brain areas dealing with grammar are not all in Broca's area and areas involving semantics are not all in Wernicke's, and

that each of the different components in the language system (phonology, syntax, semantics etc.) consist of subparts which are localised in different parts of the brain (Benson and Zaidel, 1985).

The origins and localisation of aphasia variations

In 1861 a French neurologist, Paul Broca, described a patient who had suffered a stroke leaving him with the ability to say only one word. After the patient's death, Broca studied his brain and discovered a large lesion in the frontal lobe of the left hemisphere. He concluded that this was the area of the brain responsible for controlling the production of speech, which has since come to be known as Broca's area.

Carl Wernicke, a German neurologist, studied a second group of aphasic patients in the 1870s who had considerable difficulty in understanding language. In many cases, such patients appeared to produce language reasonably fluently but close examination revealed they often spoke in a 'garbled' fashion. This pattern of deficit is referred to as Wernicke's aphasia, and occurs when there is damage to another area of the left hemisphere, Wernicke's area.

Patterns of speech impairment following damage to Broca's area

Non-fluent aphasic speech (Broca's aphasia) is slow and laboured with short utterance length (McCaffrey, 2001). The flow of speech is more or less impaired, with the finding and sequencing of articulatory movements and the production of grammatical sequences proving difficult to grasp. Speech is also choppy, interrupted, and awkwardly articulated. According to further research by Goodglass et al. (2001), the speech of the non-fluent aphasic is laborious and there are usually less than three or four words in a breath group. Both comprehension and production of language are affected by non-fluent aphasia, but comprehension appeared to be performed marginally better by patients studied by McCaffrey (2001). These results were to be expected; similar to learning a foreign language, it is easier to understand another speaker by inferring key words than to produce comprehensible sentences yourself. The speech of a Broca's aphasic is telegraphic, meaning that articles, conjunctions, pre-positions, auxiliary verbs, pronouns and morphological inflections (e.g. plurals, past tense) are omitted. In addition, output may also be restricted to noun-verb combinations.

Only the most basic and overlearned grammatical forms are produced (often limited to nouns and verbs) showing how syntax and morphology are affected. Speech is laboured and slow, melodic contour is flat. Articulatory agility is impaired and potential problems include simplification of consonant clusters (e.g. t/st, p/spl) and distortion of consonants. Patients frequently have low frustration tolerance as they are aware of errors and occasionally respond to them with distraught reactions. Studies on other languages led to the general conclusion that

agrammatics respect the word structure properties of their native language, the categorical features of bound morphemes, and inflectional paradigms.

Sentences Broca's aphasics produce in spontaneous speech are characterised by their simplicity or reduced syntactic complexity. These sentences are often incomplete, with functional elements (including grammatical inflections) being omitted. These problems usually occur in writing as well, whereas sentence comprehension is said to be more or less unaffected (Radford, 2009). When Broca's patients attempt to produce simple English sentences (italicised words in examples are those omitted) such as, 'He's going *on the* bus', the head tense position of a tense phrase (a linguistic phrase with a subject: doer, and a predicate: action) is left empty instead of being filled with auxiliary *is*, and the determiner *the* is omitted from the head position of the target determiner phrase *the bus*, the preposition *on* is omitted from the target prepositional phrase *on the bus*. 'I only passed my test *in the* afternoon', shows how determiner *the* is omitted from the target prepositional phrase *in the* afternoon. We can paraphrase the deviant or simplified utterances produced by Broca's aphasics as using normal English sentences which differ only minimally from the actual realisations. In all cases, the realisations are less complex than the target reconstructions, and omissions and simplifications typically affect functional projections.

Research in linguistics has shown that Broca's aphasics have problems in comprehending functional categories as well as in producing them. Sentence comprehension in Broca's aphasia can be studied only through structured experiments. Aphasiologists (Heilman and Scholes, 1976) have adapted various psycholinguistic techniques, such as linguistic judgement tasks, lexical decision experiments and reaction time techniques in order to assess knowledge of grammar.

The sentences, (a) The man showed her baby the pictures, and (b) The man showed her the baby pictures, were used. Two further pictures (both incorrect) were included to test for lexical comprehension, examples being pictures for sentences such as (c) The man showed her girls the hats, and (d) The man showed her the girl's hats.

The results of this experiment demonstrated that agrammatics made few lexical errors; for instance, they hardly ever chose pictures appropriate to (c) and (d) when the sentence presented was (a), but in nearly half of the trials they picked the comprehension pictures when asked to choose the picture appropriate for (b). The agrammatic patients appeared to treat (a) and (b) as ambiguous, an interpretation which is consistent with them failing to process the definite article *the* and thus treating both sentences as if they were 'The man showed her baby pictures'. Given that the comprehension disorder found in this experiment is parallel to the syntactic errors that occur in agrammatic production (in that both involve errors with function words) we may conclude that agrammatism is a fundamental disorder of the linguistic representational system (i.e. the grammar), rather than a peripheral impairment to one specific modality only.

Patterns of speech impairment following damage to Wernicke's area

Wernicke's aphasics can exhibit dissociation between the sounds of sight words and their meanings. Although the form of language may be relatively unimpaired, speech may be essentially meaningless in the most severe cases. Fitzgerald (1997) found that repetition and augmentation (adding words due to auditory comprehension deficits) are common and patients may use paraphasias (less than half of the utterance is correct), which could be due to problems with word finding. A phenomenon called press of speech also characterises Wernicke's aphasics, patients speak rapidly and interrupt others for sense of closure as they communicated what they intended (Goodglass and Kaplan, 1983). Unlike Broca's, Wernicke's aphasics tend to have a lack of awareness of their communication problems (David, 1983). This lack of concern possibly indicates the more severe cognitive problems that give Wernicke's patients a worse prognosis than Broca's.

In regards to how paraphasia patients produce errors when using content words, performance of Wernicke's aphasics on content words is affected by the frequency of the word in the vocabulary: infrequent words take longer to retrieve and are more often inaccurately retrieved than frequent words (Rosch, 1975; Rosch et al., 1976). Secondly, and more importantly, the typical error patterns that occur in paraphasias can be explained in terms of the structures which characterise the mental lexicon.

In object-naming experiments by Rosch (1975; 1976), subjects were presented with a picture of an object, and asked to name it. For example, when a target picture of a shark was shown, subresponses from the participants included fish, trout, guitar and rainbow trout. Fish and Trout represent the common types; it is possible for patients distinguish between categorisation in taxonomies: superordinate (fish, musical instrument, fruit etc.) and the subordinate level (rainbow trout, great white shark, bass guitar). These notions, as well as being significant in understanding acquisition of words, have proved important in the study of how visually presented objects are categorised by normal adult subjects. Such subjects typically categorise an object, e.g. by naming it, at the basic object level, despite the fact that logically it could be categorised as a variety of other levels. In object naming experiments with Wernicke's aphasics by contrast, the subjects' typical naming response to the picture of a shark is either the superordinate level term or a prototypical element from a basic set (trout). Wild paraphasic misnaming such as guitar occurs only in severely impaired subjects, rainbow trout is pretty much a non-existent response.

When tested with a target word of chair, the subjects' choices were chair, stair, table and apple. The role of phonetic and semantic similarity in aphasics' perception of category names had been

tested. Aphasics were asked to match a picture of an object from a set of multiple choice pictures to a test word presented orally by the experimenter. When the aphasics' produced errors in this experiment, it was typically an error of type (table), i.e. an exchange based on the semantic similarity between the test word (chair) and name of depicted object (table) – in this case, co-hyponyms. Errors such as stair are based on phonological similarity, specifically on rhyme. These were much less frequent, and wild paraphasias, such as apple, were produced only by severely impaired subjects.

These findings indicate that the meanings of words and their associative links in the mental lexicon are accessible to Wernicke's aphasics, and that only in severe cases of vocabulary deficit the associative processes begin to break down. Effects that have been found in content word paraphasias from aphasics include frequency effects, which show that low frequency content words yield more paraphasias than high frequency words. Categorisation level effects involve hyponym exchanges (sparrow – owl), the use of superordinates (sparrow – bird), similarity effects, semantic exchanges (hair – comb), and pragmatic exchanges such as flower – visit, those which are associated in everyday life.

Conclusions

From the results of mentioned experiments, we can see how patients with Broca's aphasia typically have difficulty with function words, while patients with Wernicke's aphasia may have problems with content. Function words are those such as prepositions (of, at), pronouns (he, anybody), determiners (the, that), conjunctions (and, when), auxiliary verbs (have, do) and particles (no, as). Content words are classified as nouns (room, answer), adjectives (happy, new), full verbs (search, have) and adverbs (completely, enough). Damage to Broca's area often leads to agrammatic or telegraphic speech where most of the function words have gone missing. Those with Wernicke's aphasia may speak in long sentences that have no meaning, add unnecessary words and even create made up words. There is typically better recovery of language in Broca's area than any other and more research is being conducted every day to further define the patterns of impairment and improve upon the quality of therapy to aid patients to recover.

Bibliography

Benson, D. F. and Zaidel, E. (1985). *The Dual Brain: Hemispheric Specialization in Humans*. New York: UCLA Medical Forum Series.

Carlson G. (1999). Evaluating Generics. *Illinois Studies in the Linguistic Sciences*, 29(1), pp. 13-24.

David, R. (1983). Researching into the Efficacy of Aphasia Therapy. In C. Code and D.J. Muller (eds.). *Aphasia Therapy*. London: Edward Arnold.

Fitzgerald, M. (1996). *Neuroanatomy Basic and Clinical*. Philadelphia: W.B. Saunders.

Goodglass, H. and Kaplan, E. (1983). *The Assessment of Aphasia and Other Neurological Disorders*. Baltimore: Williams and Wilkins.

Goodglass, H., Kaplan, E., and Barresi, B. (2001). *The Assessment of Aphasia and Related Disorders*. 3rd ed. Baltimore: Lippincott, Williams and Wilkins.

Kaplan B.J., and Kaplan V.A. (2003). *Kaplan and Sadock's Synopsis of Psychiatry: Behavioral Sciences/Clinical Psychiatry*. 9th ed. Philadelphia, PA: Lippincott Williams & Wilkins.

McCaffrey, P. et al. (2001). *Basic and Clinical Neuroscience of Communication Disorders*, American Speech Language Hearing Association Conference, New Orleans.

Posner, M.I. and Raichle, M.E. (1994). *Images of Mind*. Scientific American Books (s.l.)

Radford, A., et al. (2009). *Linguistics: An Introduction*. 2nd ed. Cambridge: Cambridge University Press.

Rosch, E. (1975). Universals and Cultural Specifics in Human Categorization. In: R.W. Brislin, S. Bochner and W.J. Lanner (eds.) *Cross-cultural perspectives on learning*. New York: Wiley, pp. 177-206.

Rosch, E. et al. (1976). Basic Objects in Natural Categories. *Cognitive Psychology*, 8(3), pp. 382–439.

On the Road to Democracy with Sticks and Carrots. The Relationship between Military Funding and Democratization.

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ABSTRACT

Modern statehood has shown that the military is too much of an important factor to be ignored in the formation of foreign or even domestic policies. There are times when circumstances align in a way which increases the chances of intervention, for instance, weak government, increased popularity of the military, or development of any other formidable motives. This article, however, analyzes how budgetary assignments affect the intention of the military to intervene and what the magnitude of its effect is upon democratization. The argument is based around two theories, one which states that increases in military resources will make it one less enemy for a government that is starting to democratize. A stronger military will be able to protect the government from unwanted turbulence and a larger piece of the budget is more likely to keep it busy figuring out workings of advanced weaponry. The second theory is the opposite. It is based around two contentions, one of which concerns leaving more budget to democratic social programs, while the other states that a weaker military will not be prepared for a coup. Using simple OLS, theories were tested regressing Polity Combined – a variable that records various government qualities on a 20 point scale – against military budget as a percentage of GDP. Resulting cross-national analysis of 115 countries provides support for the second theory: governments that generally spend less on their military are usually more democratic.

Introduction

This essay is an attempt to establish the relationship between military funding and a level of democracy by analyzing 115 states in a cross-sectional study. The first part of the essay is dedicated to a summary of related literature and the development of testable theories. Literature on dynamics of the relationship between military expenditure and democratization is split. One school of thought claims that governments should increase military expenditure to provide a stable environment for further development of democracy, also known as the *Increased Resources* theory. A second theory of *Decreased Resources* states the opposite. State leaders should decrease military expenditure in order to limit the military's strength and thus its ability to intervene. In the second part of the essay method, research design and the reliability of the data are assessed in

more detail. After regressing the variables against each other a significant support for *Decreased Resources* theory is observed.

Theory

This essay will examine the dynamics of the way the military and the ruling group interact with each other and what outcome is more likely to be achieved. The 20th and 21st centuries showed that the military is a too important factor to be ignored in the formation of foreign policy or even domestic policies. This can be seen in almost any group of states, whether developed or not. Furthermore, during governmental transitions, it would seem, the importance of the military is ever increased because this transformation of the government may present an *opportunity* for intervention and increase the *popularity* of the army (Finer, 1988, pp. 65-76).

The primary focus on the relationship between military and democracy is based on conclusions from Beatriz (2008); she claims her findings show that the biggest probability of transition occurs between militaristic and democratic governments. While the probability of a military government turning into democracy is 0.0455, the second most likely transition is from a hegemonic party system with a probability of 0.0188, which clearly points to the intricacy of the dynamics of the former relationship (Beatriz, 2008, p. 737). However, is increased military funding during transitions more likely to invoke interventionist intentions, or otherwise? There is no consensus among literature; however, the two different views are well summarized and developed by Clardie (2010).

Increase Resource Theory

There are two main reasons identified in the literature showing that increasing army resources is beneficial to democratic transition. The first is simply to appease the military. The logic of this argument springs from the notion that democratic transitions result from bargaining between rivaling political groups and it is very important that the military should not perceive itself a loser in the transition (Clardie, 2010, pp. 3-5). In other words, should officer corps see potential damage (e.g. budget cuts), they may oppose democratization and push their own agenda. To avoid this, a government should give the army plenty of new toys to play with while politics are resolved by politicians. It is in the interest of a new government to increase resources and keep the army satisfied.

The second reason to increase resources is to ensure domestic stability in a post-transitional polity. The basis of this argument recognizes that often transitions are marked with domestic turmoil and conflict between rivaling political forces. It may be a conflict between old groups that found a place and time for their competition during this fragile period, or it may be a result

from an inclusion of new players in policy making. In any case, a new government faces an insecure and unstable environment (Clardie, 2010, pp. 6-7). To ensure a government's survival a strong military is required so that it may protect the work of legislatures and provide order for a further development of democracy. Thus, the military may require an increase in resources to cope with domestic tensions. However, this might be a double-edged sword; the military may grow dissatisfied with a new democratic government and use these newly acquired resources as means to perform a *coup d'état*. This particular paradox leads into the argument for a decrease in resources.

Decrease Resource Theory

Similarly to the *Increase Resources Theory*, this school of thought also provides two reasons for why a decrease in resources is more likely to be beneficial for democracy. First reason is that by increasing military strength, a government increases a chance for a military intervention because the army will have greater abilities to ensure a successful coup (Clardie, 2010, p. 8). Publics and leaders can be suspicious of the weaponry the military has at their disposal and the many recruits who can be equipped. For this reason, it is best to decrease military expenditure thus limiting its scope of influence.

The second reason to decrease resources focuses on the negative impact an increased military expenditure may have on society. It is important to a newly constructed government to focus on providing better education and other social benefits. Developing rational welfare, taxation and budgetary systems is incredibly important for a healthy advancement of a political culture. In this case, an increase in military funding can result in a decrease in social expenditure and therefore a limited ability to provide public benefits associated with democracy (Clardie, 2010, p. 9). If a government does not deliver these benefits the public can grow discontent with a new government, thus creating a possible support base for opposition movements.

This can be a motive for the military to oppose the government as well. Motives for the disposition of government deserve a separate discussion, which due to limitations of this essay had to be excluded. However, the military as a defender of the nation as opposed to the government – Finer named this phenomenon “the manifest destiny of the soldiers” – can denounce the government as being incapable of delivering public benefits and assume civil control by means of violence or blackmail (Finer, 1988, p. 28). It brings us yet to another paradox: if one increases social expenditure, then the military may grow dissatisfied because their needs are not being met; if one decreases social expenditure, then the military may assume that a government is not handling its job properly. However, logic of state development proposes that decreasing resources to the military may allow governments to spend more on economic

development, health, education and administrative infrastructures, all of which should increase the survivability of democracy as concluded by Geddes (1990) and Londregan and Poole (1990).

The Corporate Interest

We have established the two theories this essay will test, but there is one point recurring in both that needs to be extrapolated, namely the apprehension officer corps hold for the military's survival and efficiency. This corporate interest suggests a concern with the preservation of hierarchy, discipline, and cohesiveness within the army; independence from civilian intervention; and funding to attract new recruits and acquire advanced weaponry (Geddes, 1990, pp. 126-27). In countries where joining the military is one of the conventional career paths, acquisitive motives can be assumed to rank high in most officer corps' preferences, if only because the existence of opportunities depend on the survival of the military.

Some officers are tempted to intervene during transitions, others have high legalist or moral values that prohibit intervention and most are floating somewhere in between – but almost all care about the survival and efficiency of the military. Therefore, given the opportunity for intervention, officers want to move in or out of politics as a cohesive whole, because once factions split apart and take up arms against each other, it is very difficult to restore previous order, trust and unity (Geddes, 1990, p. 128). Given this concern officer corps hold for military strength, it is reasonable to believe that resources in the form of advanced weapons (aircrafts, tanks, missile batteries, etc.), increased salaries, health benefits or better housing for high officials can make a difference in the military's behaviour and, therefore, in the regime's outlook, as well.

Although opposition from outside the ruling group and numerous exogenous shocks (e.g. global economic crisis) sometimes decisively affect a regime's survival, by focusing on internal dynamics of a state, specifically on the relationship between military and government, I will try to assess a level of influence it has on a regime's transition to democracy. Often a military decision to intervene is made after carefully investigating the opportunity, developing popularity and acquiring motives. The interest of this essay is to see on which side of the scale the military expenditures are situated. Does increased funding push the army to intervene or is it otherwise? It should not be expected that a theory of social science will explain every bit of variance in the outcome. Most, if not all, theories do not and this is not an exception. It is expected, however, to record the degree and velocity of influence military funding has upon the democracy level of a regime, rather than claim that this is the only factor connecting the military to interventions.

Hypothesis

H1: An increase in military funding (as percentage of GDP) will generate an increase in a level of democracy (as a score on Polity Combined scale).

Research Design

This essay will analyze cross-sectional data from 115 states. Using simple Ordinary Least Squares (OLS), military expenditures will be regressed against Polity Combined scores. Ideally time series data of each state would be more compatible, however due to time and space limitations this had to be avoided. The sample used in this essay was determined by the Pippa Norris data set (Norris, 2009). The democracy level variable Polity categorizes governments from strongly autocratic, which have a score of -10, to strongly democratic, with a score of +10. A principle by which states have been selected for this study is defined in terms of readily available data, so a state with a recorded Polity Combined value entered a test sample. This provided us with a very vibrant data-set which includes developed democracies such as the US, Australia, Scandinavian countries and most of the regimes in western Europe, but also developing regimes found in Latin America, Africa, and Southern Europe, followed by autocratic regimes from the Middle East, and parts of Africa. Our objective here is to see how different funding strategies towards the military affect the regime itself, and the sample of 115 different states will do just that. If nations with high scores on Polity variable will appear to be associated with high military expenditures then our hypothesis will be satisfied providing support for *Increased Resources* theory; if the opposite is observed then *Decreased Resources* theory will hold true.

Dependent Variable

Democracy Level. The dependent variable is the 21 point Polity Combined scale recorded in 2002. The variable itself is constructed by conceptualizing qualities related to democratic and autocratic authority in governmental institutions, rather than by categorizing states according to restricted forms of state rule. It is this unique feature of the Polity Project that enables analysts to compare states through a spectrum of governing authority. The range of governments captured by the scale goes from institutionalized autocracies, through mixed regimes also known as ‘anocracies’ to fully consolidated democratic regimes (Marshall, 2011, p. 1). This variable records major qualities of executive recruitment, constraints on executive branch, and the level of political competition (Marshall, 2011, p. 1). Although one of the requirements of OLS is continuity of the dependent variable, a 21 point scale with a possible zero and values in between the points can be considered continuous. The structure of the dependent variable, although ordinal in its nature, does not violate any of the OLS assumptions.

Independent Variable

Military Expenditures. Military funding is operationalized as a part of general domestic product dedicated to the military in year 2000; the data is from the Pippa Norris dataset (Norris, 2009). However, there are two issues related to the measurement of the main independent variable that deserve discussion. The first problem concerns the reliability of data. Official reports of military expenditure do not tell the whole story about what is happening in the budget (Clardie, 2010, pp. 10-13). Officer corps can employ corrupt practices and this way gain resources outside the formal budgetary. It would be very comfortable if official reports included the amount of resources achieved this way, however, they do not; thus it is a reasonable case for some measurement error. Another issue which might increase the probability of a measurement error is that the measurement error associated with a possible engagement in corruptive practices (mentioned earlier) may be correlated with low scores on the Polity scale (Clardie, 2010, pp. 10-13). Put differently, the military that uses corrupt means to attract additional resources, has the potential to damage democratic development and lower the chances of a successful consolidation of democracy. This means there is reason to believe that the model might have some bias since the measurement error associated with military funding is correlated with the dependent variable.

In order to better grasp the nature of the data used in our model, a table of descriptive statistics is presented below. From *Table 1* we can see that our test sample is relatively anocratic, a mean value of Polity Combined is 4.10, suggesting that this particular group of states is open to liberal institutions. The lowest value of -10 is observed only once and assigned to the Kingdom of Saudi Arabia, a regime with few, if any, opportunities for representative participation in state affairs. On the other hand the positive end of the scale is occupied by various consolidated democracies ranging from the US to Eastern European states such as Lithuania. Military expenditure as percentage of GDP, on the other hand, is a more dynamic measure with a mean value of 2.76 percent. This offers us an interesting perspective on the importance of the military in modern times, only a 30th part of the budget is assigned to the military across the sampled states. For this variable the low end of zero is uniquely and solely the virtue of Costa Rica that abolished armed forces in 1949. In contrast, the highest sampled military expenditure belongs to Eritrea, a country that fought a 30 year long war of independence against successive Ethiopian governments since 1960.

Descriptive Statistics				
	Min. Value	Max. Value	Mean	Std. deviation
Polity Combined	-10	10	4.10	6.23
Military Expenditure	0	23.5	2.76	2.88
Ethnolinguistic Fractionalization	0.002	0.93	0.44	0.24
Internal Conflict	0	1	0.17	0.38
Electoral Systems	0	1	0.24	0.43
GDP per capita	90	41974	7019	10039
N=115				

Table 1

Control Variables

GDP per capita. A first control included in the model is the wealth of the country measured as GDP per capita in the year 2002. The most prosperous nation of the sample in that particular year was Norway with a GDP of 41,974 US dollars, while its opposite Ethiopia had a GDP of only 90 US dollars. Zakaria (2007, pp. 96-100), for example, claims that economic prosperity is one of the necessary conditions for consolidation of democracy and in this instance our two countries score a 10 and 1 on Polity Combined scale respectively. Therefore, it is expected that GDP per capita will be positively related with a democracy level.

Ethnic Fractionalization. A second variable the model controls is ethnic fractionalization present in 2002. It is measured as a ratio varying between 0.0 and 1.0 with low points associated with low levels of ethnic fractionalization. This variable suggests that the more diversity there is in a state, the more difficult it is for a democratic process to develop because governmental institutions will have more problems including all interests into policy making. Even though it is neither a sufficient nor a necessary condition for democratic development – there are many prosperous democracies, as for example the US itself where the electorate can be divided across ethnic and religious lines – this study expects this variable to be negatively related with a level of democracy.

Internal Conflict. This control is coded as a dummy with ‘1’ for those states that experienced an armed conflict between a state and its population in the year 2000. Domestic turbulence in the form of violent encounters is very much a threat to democracy and may significantly affect its further development, especially if a regime has just experienced a transition. A mean value of the dummy variable shows only a binomial distribution and from this we make out that 17 countries have suffered from internal turmoil among those being some of the more autocratic regimes of

Rwanda with a Polity Combined score -4, Chad -2, Uganda -4 and Algeria -3. Internal conflict, therefore, should be negatively related with a level of democracy.

Electoral Systems. This is another dummy control included in the model. It is coded as '1' for those countries with legitimately working electoral systems in the year 2001. 'Comparative Study of Electoral Systems' is an international project that tries to record turnout levels, vote choice, party affiliations and the number of candidates. From Table 1 we see that 24 countries have been coded as having legitimate representative institutions and most of those are assigned to the developed world. Politically active publics tend to be very responsive in regard to changes in the administration; therefore the scope of military's influence in such societies is limited by the process of constitutional legitimization of authority. It is expected that politically active societies will have a positive effect on the level of democracy.

Method

The method employed to test the hypothesis is OLS. It is simple to use and is known for its wide range of applicability. With the types of variables selected for this model there should not be any issues regarding the mechanics of OLS. A test for multicollinearity did not show any significant correlations between independent variables suggesting that the calculations of individual predictors do not influence each other. In other words, their effect is independent, which contributes to the model's accuracy.

However, there are several problems concerning cross-sectional data and this model in particular. Firstly, cross-sectional models are likely to be heteroscedastic, this is usually solved by using robust standard errors and by accounting for clusters among certain Polity Combined points. Unfortunately the limits of this essay do not allow for such precise modeling, leaving this issue to be addressed by future research. Secondly, it would be false to assume that an increase or a decrease in military funding would immediately manifest itself in a change of the military posture. In time series data this is dealt with by lagging the variables by one or several orders. Here, however, to account for this, Polity Combined variable represents the year 2002 while military expenditures were recorded at the year 2000, giving us a *lag* of two years.

Results

Regression results show significant support for the *Decreased Resources* theory. The model (Table 2) fails to satisfy the null hypothesis and a low value of *p* ratio ($p=.000$) indicates that the main independent variable, military expenditure as percentage of GDP, is significant. The relationship is a relatively strong one, R squared suggests that 40 percent of variation in the dependent variable can be explained using this model. Results of the OLS concluded that there is a negative

relationship between the main independent variable, military funding, and a dependent variable, Polity Combined scale. In other words, as governments dedicate larger shares of their GDP, the democracy level in a state decreases or, to put it technically, a unit increase in military expenditure as a percentage of GDP will generate a 0.8 decrease in Polity variable.

The Effect of Military Expenditure upon Democratization (OLS)

	Coefficient	Standard Error	t-Ratio
Military Expenditure	-0.79***	0.17	-4.84
Ethnolinguistic Fractionalization	-5.98***	2.15	-2.78
Internal Conflict	1.43	1.29	1.11
Electoral Systems	3.57***	1.27	2.8
GDP per capita	9.16E-5	0.0	1.59
Constant	7.14	1.33	5.39

R²=0.40, N= 115

*p<0.05, **p<0.03, ***p<0.1***

Table 2

The model presented two significant control variables. The first is a presence of a politically active public, *Electoral Systems*. As expected, a politically educated culture is positively related to a level of democracy because for such a population, the government has to construct legitimate taxation and representation systems that put constraints on the ruling group, all of which increases the level of democracy. The second significant control is ethnic fractionalization; the negative coefficient implies that pluralistic societies will have more trouble building democratic regimes. It follows in political theory that generally a homogenous society is more likely to agree on policy decisions and find consensus regarding emerging problems (Zakaria, 2007, pp. 119-62). Therefore, a presence of conflicting interests may slow the process of democratization in the best case and cause a stalemate in the worst.

Two other controls, the presence of an internal conflict and GDP per capita, did not reach significance levels. Although the wealth of the country is considered to be one of the prerequisites for democracy development, this model could not record its effect; however, the variable came close to significance with *p* ratio of 0.1. On the other hand, Przeworski and Limongi (1997) even developed a benchmark of required wealth for consolidation of democracy of GDP per capita equal to 6000 dollars. As mentioned earlier, a model might suffer from inconsistency because it did not account for possible heteroscedasticity. Modeling time series data could eradicate this problem because the gradual accumulation of wealth would be captured more precisely. Internal conflict, although assumed to have a negative impact on democracy, also did not achieve significance. Looking at present democracies in the world, it is not always the case that having a

militant opposition will damage the democratic government. For example, violent encounters between Israel and the Palestinian population do not seem to deteriorate Israel's democratic process. Alternatively, India, the largest democracy in the world, is still able to conduct democratic elections despite having to control many Muslim extremist groups.

Practical implications of the negative relationship between military spending and a level of democracy point to the importance of agency, in this case the army, during transitions. Modern statehood invited the military to stand beside the politics and contribute to foreign and even domestic policy making. It should not be surprising though that politicians have difficulty handling modern warfare and conflicts, because the complexity of contemporary combat tactics, the expertise required to control state-of-art weapons, and a strong sense of respect GIs hold for higher officers are exclusively associated with responsibilities of the army. Yet, governments emerging as newly democratic should be very cautious of the scope of a military's influence. Although there are reasons to believe that a new regime should immediately establish good relations with the military by giving extra resources, empirical testing of this relationship shows the opposite. State leaders should regulate the strength of the military by decreasing its resources as to safeguard the government from a military intervention. Weaker military will have a higher probability of an unsuccessful deposition of the ruling group. For this reason officer corps will be reluctant to join a conspiracy and likely to return to the barracks. On the other hand, whilst rationalizing the budget, state leaders should concentrate on building a politically educated society, developing constitutional constraints on authority and increasing economic well-being, all of which should increase the level of democracy.

Conclusion

This essay empirically tested the relationship between military funding and democracy. After assessing the literature on transitions and the characteristics of military, two testable theories were drafted. The *Increased Resources* theory supports the view that increasing military funding will appease the military and provide extra resources, so that the military will be sufficiently equipped to control domestic turmoil. *Decreased Resources*, which springs from the logic that lowering the share of budget dedicated to the military will allow the government to spend more on public benefits associated with democracy and limit the strength of the military, so that it will refrain from intervention. Accordingly, two hypotheses were tested by means of a simple OLS model. After the data was regressed a negative relationship at 0 percent level was observed between the democracy level and military expenditure, supporting the *Decreased Resources* theory.

These findings also contribute to a broader understanding of the democratization process. Given that the model has not been able to explain the rest of the 60 percent of variance, it is safe to assume that the process itself is very complex and affected by even more factors some of which

cannot even be computed. For example, corruption associated with misconduct of budget allocation, misappropriation of office and even single prolific characters that can shift the power play to one side or the other. Therefore, while we scratched the surface of the relationship between military institutions and the regime itself, democratization should be viewed as a struggle of many forces for a vibrant society.

Bibliography

Beatriz, M. (2008). Credible Power-Sharing and the Longevity of Authoritarian Rule. *Comparative Political Studies*, 41(4/5), pp. 715-41.

Clardie, J. (2010). The Impact of Military Spending on the Likelihood of Democratic Transition Failure: Testing Two Theories. *Armed Forces and Society*, pp. 1-18.

Finer, S.E. (1988). *The Man on Horseback*. 2nd ed. London: Pinter Publishers.

Geddes, B. (1999). What Do We Know about Democratization after Twenty Years? *Annual Review of Political Science*, 2, pp. 115-44.

Londregan, J.B., and Poole, K. (1990). Poverty, the Coup Trap, and the Seizure of Executive Power. *World Politics*, 42(2), pp. 151-83.

Marshal, M.G. (2012). *Polity IV Project: Political Regime Characteristics and Transitions, 1800-2009*. Center for Systemic Peace. Center for Systemic Peace, [online] available at: <<http://www.systemicpeace.org/polity/polity4.htm>> [accessed 15 March 2011].

Norris, P. (2009). *Democracy Cross national Data Release 3.0, Spring 2009*. John F. Kennedy School of Government, Harvard University, [online] available at: <<http://www.pippanorris.com/>> [accessed 15 March 2011].

Przeworski, A., and Limongi, F. (1997). Modernization: Theories and Facts. *World Politics*, 49(2), pp. 155-83.

Zakaria, F. (2007). *The Future of Freedom*. 2nd ed. London: W. W. Norton & Company.

Estimating Future Starting Salaries: Do Anchors Influence the Range of Values Which seem Plausible?

Michael Caley

ABSTRACT

The experiment aimed to determine whether numerical anchors influence the range of values that students believe are plausible for their starting salary following graduation. Three possible accounts of how anchors affect this range were proposed: not influencing the range at all, pulling the entire range towards it, or pulling only the nearest end of the range towards it. Participants were presented with a version of the standard anchoring paradigm, receiving either a high, low or no anchor. A significant interaction between judgement and anchor condition was found. The results are consistent with the third prediction - the high anchor only significantly increased participants' upper judgements whereas the low anchor only decreased lower judgements. It is suggested that anchors will still affect participants' plausible ranges even when information relevant to the anchor value is accessible.

Introduction

The standard anchoring paradigm is used to demonstrate how the provision of a numerical anchor value can influence intuitive judgements; exposing participants to a high or low anchor in a comparative question biases their judgement when giving their best estimate of the target quantity. Jacowitz and Kahneman (1995) exemplified this effect by asking participants to estimate 15 quantities, such as the height of Mount Everest, having been exposed to a high anchor (e.g. 45,500 feet) or low anchor (e.g. 2000 feet). Evidently participants' judgements were biased towards the anchors, as average estimates of participants in the high anchor condition was 42,550 feet, yet 8000 for the low anchor condition. Moreover the effect also arises when the anchors give no actual indication of the true value of the target quantity (Tversky and Kahneman, 1974).

A slightly dated explanation of this phenomenon attributes the effect to the use of an anchoring-and-adjustment heuristic (Tversky and Kahneman, 1974). This proposes that people select the anchor as a reference point and reject it, yet fail to muster the mental effort to sufficiently adjust from this. Evidence suggests that this approach is used for some numeric judgements (e.g. Epley and Gilovich, 2001). However, it is seemingly only useful for self-generated reference points, and research has demonstrated that this does not explain the effect observed in the standard

anchoring paradigm (Epley and Gilovich, 2005). The selective accessibility model (Strack and Mussweiler, 1997; Mussweiler and Strack, 1999) offers a better explanation, suggesting that participants complete the comparative task by selectively activating anchor-consistent knowledge – which then biases their judgement due to increased accessibility. Mussweiler and Strack (2000) found evidence for this themselves, concluding that lexical decisions were faster when the letter string contained semantically related words.

Anchoring effects have not only been observed in artificial experimental settings, but also in real-life situations; Northcraft and Neale (1987) reported that presenting a listing price biased real-estate agents' estimations of the value of a house. Anchor effects are thus an important area of psychology and will be the focus of the present experiment. In order to conduct an externally valid study it will address the growing interest in attitudes towards salary as this is frequently linked to well-being; employees' life satisfaction is related to both their absolute salary and their income relative to those of other workers (Boyce et al., 2010; Brown et al., 2008). Consequently this experiment will focus on the judgements of students regarding the estimated salary of their first job following graduation.

Although anchors appear to influence people's best estimates, when making intuitive judgements people tend to use a range of possible values for a target quantity (Mussweiler and Strack, 1999). Asking participants to indicate this has elapsed previous research. Therefore this experiment aims to determine whether anchors affect the range of values people think are plausible. A similar method to Jacowitz and Kahneman (1995) will be used; participants will receive either a high anchor, a low anchor or no anchor (the control condition). All will then indicate a range of salaries which they are highly confident will contain their starting salary, providing a lower judgement (the lower limit of the range of plausible values) and an upper judgement (the upper limit of the range).

One possibility is that anchors influence people's best estimate of a target quantity but not the range of plausible values, which would suggest that people do not adjust their upper and lower limit of the range when provided with a reference point. Another possibility is that both upper and lower judgements will be assimilated to the anchor, dragging the entire range of plausible values towards it. This is in accordance with Jacowitz and Kahneman (1995), who found that anchors also affect people's confidence in their judgements; participants may treat the anchor as useful information and use it when assessing the range of possible values. A third possibility is that anchors only influence the closest end of the range - pulling that end towards it and not the other end. Notably if the study exemplifies the second or third possibility, not only would the results serve as further support for the anchoring effect, but they would also expand upon previous literature by indicating to what extent ranges are affected.

Method

Participants

A convenience sample method produced 168 participants; however 6 were excluded having produced responses more than 3 standard deviations from the mean – hence 162 were used for the final sample (58 males, 104 females). All were undergraduate students; ages ranged from 19 to 50 years ($M = 21.12$, $SD = 3.94$ years).

Materials

Different study materials were used for each anchor condition. Question sheets for the low and high anchor conditions firstly asked participants to indicate whether they believed their starting salary after graduating will be more or less than an anchor value (£8000 for the low anchor condition, £80000 as the high anchor). There was no such comparative question for participants in the no anchor condition.

Materials for all conditions then featured a sentence for participants to complete, asking them to indicate a range of salaries which they were highly confident (90% sure) would contain their starting salary after graduating. Spaces were provided for them to specify their lower and upper judgement.

Design

The participants' 90% confidence intervals for their estimated starting salary were used as the dependent variable. The experiment used a 2x3 mixed design. Judgement was a within-subjects factor with two levels: lower judgement and upper judgement. Anchor condition was a between-subjects factor with three levels: low anchor ($n = 57$), no anchor ($n = 52$), and high anchor ($n = 53$), and participants were randomly allocated to each of these three conditions.

Procedure

Participants were not informed of the true nature of the research prior to completing the experiment, nor of which anchor condition they had been allocated to. They were informed that it would only take a minute of their time and were asked to complete the task in a quiet setting. Participants in the low and high anchor condition completed two parts of the experiment: indicating whether their starting salary will be more or less than an anchor value, and specifying their upper and lower judgements. Participants in the no anchor condition simply provided their upper and lower judgements.

Results

Each participant provided a lower and upper judgement, which were averaged to obtain a mean response for upper and lower judgements in each anchor condition. In the low anchor condition, 8 participants responded “less” to the comparative question and 49 responded “more”. In the high anchor condition, 2 participants responded “more” and 51 responded “less”.

As Table 1 and Figure 1 show, judgements of participants in the low anchor condition are lower than those of participants in the no anchor condition, whereas the judgements of participants in the high anchor condition are high relative to the no anchor condition. This suggests that the anchors influenced the participants' plausible ranges. A 2x3 mixed ANOVA found a statistically significant main effect of judgement, $F(1,159) = 164.70$, $p < .001$, eta-squared = .51, indicating that participants' upper judgements were indeed higher than lower judgements (a large effect size).

Table 1. Mean responses for upper and lower judgements in each anchor condition, and their standard deviations.

	Mean response	Standard deviation
Lower judgement		
Low anchor	£13,528.07	£5,333.38
No anchor	£16,947.12	£7,496.95
High anchor	£18,394.34	£9,985.54
Upper judgement		
Low anchor	£21,566.30	£13,305.14
No anchor	£25,250.00	£10,984.61
High anchor	£33,094.34	£20,476.31

The 2x3 mixed ANOVA also found a significant main effect of anchor condition, $F(2,159) = 7.52$, $p < .01$, eta-squared = .086, indicating that participants' mean responses differed significantly between the anchor conditions (a small effect size). However, this does not show which conditions differ (merely that there are significant differences in group means).

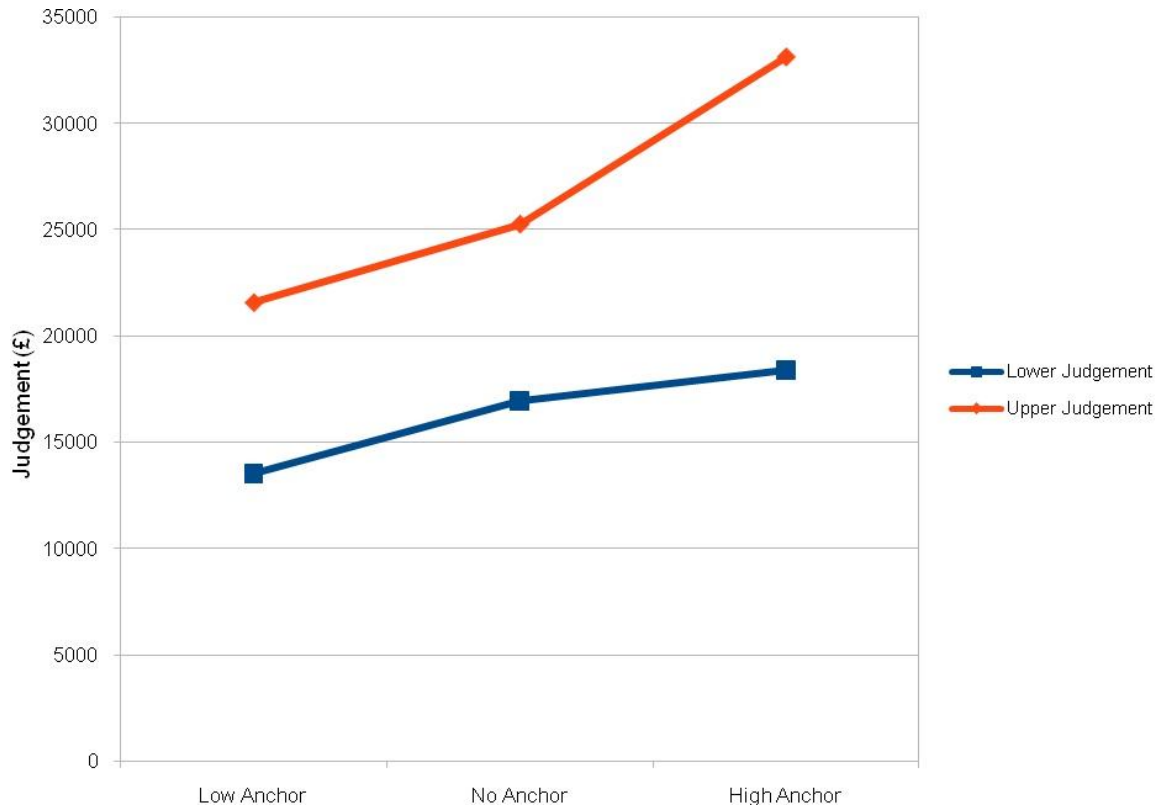


Figure 1. Mean responses for upper and lower judgements in each anchor condition.

Additionally, the 2x3 mixed ANOVA found a significant interaction between anchor condition and judgement, $F(2,159) = 7.25$, $p < .01$, eta-squared = .084. This indicates that the effect of anchor condition depends upon level of judgement; it differs for lower and upper judgements. This is demonstrated in figure 1, as the lines on the graph are non-parallel.

The interaction was decomposed to determine whether anchor condition significantly affects lower and upper judgements. Firstly, a one-way between-subjects ANOVA found a significant difference in participants' lower judgements among the three anchor conditions, $F(2,159) = 5.70$, $p < .01$, eta-squared = .067, indicating that there is a significant effect of anchor condition on lower judgements. Subsequently planned comparisons were used to individually compare the low and high anchor conditions against the no anchor condition. An independent-samples t-test found that the lower judgements of participants in the low anchor condition were significantly lower than those of participants in the no anchor condition, $t(107) = 2.76$, $p < .01$. This suggests that the low anchor dragged down the participants' lower judgements. However, an independent-samples t-test failed to find a significant difference between judgements of participants in the high and no anchor conditions, $t(103) = .84$, $p > .05$, indicating that the high anchor did not affect their lower judgements.

Secondly a one-way between-subjects ANOVA found that participants' upper judgements differed significantly among the three anchor conditions, $F(2,159) = 7.92$, $p < .01$, eta-squared =

.091, indicating that there is a significant effect of anchor condition on upper judgements. An independent-samples t-test found that upper judgements of participants in the low anchor condition and no anchor condition did not differ significantly, $t(107) = 1.57, p > .05$, suggesting that the low anchor did not affect participants' upper judgements. However, an independent-samples t-test found that judgements in the high anchor condition were significantly higher than those in the no anchor condition, $t(103) = 2.44, p < .05$. This indicates that the high anchor increased participants' upper judgements.

Discussion

The research question relates to whether the range of plausible values that students believe will contain their first salary is influenced by anchors. Three predictions proposed how anchors would affect this range: not influencing the range at all, pulling the entire range towards it, or pulling only the nearest end of the range towards it. The results are seemingly consistent with the third prediction; the low anchor dragged down participants lower judgements but did not significantly affect their upper judgements, whereas the high anchor increased participants' upper judgements yet did not affect their lower judgements. This suggests that providing an anchor pulls the nearest limit of the plausible range towards it, but does not influence the other end of the range.

In accordance with previous research including Jacowitz and Kahneman (1995) and Northcraft and Neale (1987), this study further demonstrates that anchors can exert powerful influence over intuitive judgements. The selective accessibility model of this effect would suggest that anchor-consistent knowledge was activated when answering the first question, and this remained activated when providing estimates. However unlike Mussweiler and Strack (2000) further experiments were not conducted to test levels of knowledge activation, which is recommended for replications.

Alternatively, the insufficient adjustment explanation would suggest that anchors biased the closest limit of the range because participants failed to make a judgement that was sufficiently far from it. However since anchor condition was a between-subjects factor, there is little indication of how far participants' anchored responses deviate from their estimates without exposure to an anchor. Thus replications of this study could use a within-subjects longitudinal design, whereby participants provide an estimate before and after receiving an anchor. Using the first, unbiased estimate as a control would minimise possible subject variables such as social rank, as identified by Boyce et al. (2010).

Notably, the difference between the upper judgements of participants in the high anchor and no anchor conditions was greater than the difference between the lower judgements of participants

in the low anchor and no anchor conditions. This suggests that providing a high anchor had a greater effect than providing a low anchor; people are seemingly more willing to extend their plausible range towards a higher anchor. This has particular relevance to the study of subjective probability assessments regarding salary judgement: further research could test the prediction that people's plausible ranges are more biased towards an anchor if it seems the more favourable possibility.

Furthermore the results support Jacowitz and Kahneman's (1995) findings regarding people's confidence in their judgements – as participants appeared to treat the anchors as useful information and used it to decide their plausible range. (However, Jacowitz and Kahneman used confidence as a dependent variable). Consequently the findings also support Mussweiler and Strack's (1999) speculations that people do use a range of values when making intuitive judgements, as participants gave their responses in high confidence. Extreme anchors appear to extend this range towards it, and it is suggested that there are mechanisms which compare plausible and implausible values; Mussweiler and Strack (1999) suggest that plausible values generate anchor-consistent information, and implausible values (the anchors) are used as starting points to determine an acceptable value. This is in line with the selective accessibility model. Interestingly Mussweiler and Strack (1999) also indicate that the distribution of possible values for a target may depend on the amount of knowledge about it (i.e. their level of 'certainty') – hence further research could involve testing students with greater knowledge regarding graduates' starting salaries (e.g. finance or economics students) to see whether their plausible range is minimised. Alternatively like Northcraft and Neale (1987), information relevant to the anchor value could be provided (e.g. average starting salaries of graduates in certain professions). Based on previous findings it is expected that anchors will still influence participants' plausible ranges.

Bibliography

Boyce, C.J., Brown, G.D.A., and Moore, S.C. (2010). Money and Happiness: Rank of Income, Not Income, Affects Life Satisfaction. *Psychological Science*, 21 (4), pp. 471-475.

Brown, G.D.A., et al. (2008). Does Wage Rank affect Employees' Well-Being? *Industrial Relations*, 47 (3), pp. 355-389.

Epley, N., and Gilovich, T. (2001). Putting Adjustment Back in the Anchoring and Adjustment Heuristic: Differential Processing of Self-Generated and Experimenter-Provided Anchors. *Psychological Science*, 12 (5), pp. 391-396.

Epley, N., and Gilovich, T. (2005). When Effortful Thinking Influences Judgmental Anchoring: Differential Effects of Forewarning and Incentives on Self-Generated and Externally-Provided Anchors. *Journal of Behavioral Decision Making*, 18 (3), pp. 199–212.

Jacowitz, K.R., and Kahneman, D. (1995). Measures of Anchoring in Estimation Tasks. *Personality and Social Psychology Bulletin*, 21 (11), pp. 1161–1166.

Mussweiler, T., and Strack, F. (1999). Hypothesis-Consistent Testing and Semantic Priming in the Anchoring Paradigm: A Selective Accessibility Model. *Journal of Experimental Social Psychology*, 35 (2), pp. 136–164.

Mussweiler, T., and Strack, F. (2000). The Use of Category and Exemplar Knowledge in the Solution of Anchoring Tasks. *Journal of Personality and Social Psychology*, 78 (6), pp. 1038–1052.

Northcraft, G.B., and Neale, M.A. (1987). Experts, Amateurs, and Real Estate: An Anchoring-and-Adjustment Perspective on Property Pricing Decisions. *Organizational Behavior and Human Decision Processes*, 39 (1), pp. 84–97.

Strack, F., and Mussweiler, T. (1997). Explaining the Enigmatic Anchoring Effect: Mechanisms of Selective Accessibility. *Journal of Personality and Social Psychology*, 73 (3), pp. 437–446.

Tversky, A., and Kahneman, D. (1974). Judgment Under Uncertainty: Heuristics and Biases. *Science*, 185 (4157), pp. 1124–1130.

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