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You and I, Past and Present

Cognitive Processing of Perspective

This article describes an experiment investigating the relationship between deictic elements of focalisation and readers' perspective-taking within imaginative conceptualisations of a fictional narrative scene. The text variables tested here are whether the narrative is written in the first or second person, and whether the narrative is written in the present or past tense. The experiment tests the existence and nature of a relationship between these person and temporal deictic elements of focalisation and the likelihood of a reader's visual perceptual identification with the position of a narrator, narrator-character and / or character focaliser within a fictional scene. Within the experiment, participants read one of four variants of a short fictional text identical but for the person or tense employed in the narration. Results of the experiment suggest that person and temporal deixis both impact upon conceptual perspective-taking. Specifically, the results corroborate predictions that the present tense is more likely than the past tense to elicit readerly conceptual identification with a narrator, narrator-character or character focaliser. Perhaps more surprisingly, however, the results also suggest that there is no significant difference between first and second person narration with respect to readers' reported conceptual identification with the viewpoint of the narrator, narrator-character or character focaliser designated by that pronoun.

1. Introduction

Readers' processing of narrative fiction, and, in particular, a sense of conceptual 'transportation' into the fictional worlds of stories (Gerrig 1993; Walton 1990) and related mental imagery (Esrock 1994), has been widely explored in cognitive poetics, psycholinguistics and narratology in recent decades. There is general agreement that the singular first person and the second person narrative modes (that is, narration using 'I' or 'you') are broadly more likely than the third person narrative mode to prompt reader-identification with or conceptual projection to the viewpoint of the narrator, narrator-character or character focaliser designated by that pronoun (e.g. Green 1995; Herman 2004; Sanford and Emmott 2012). Some experimental work has corroborated the intuitively perceived differences in readerly experiences and relative conceptual immersion in reading first vs. third person narratives. However, there has as yet not been much comparative research into the differences in readerly perspective-taking between the first and second person narrative modes in texts other than those describing transitive processes, or on the impact of tense on the likelihood or ease of readerly conceptual perspective-taking relative to the narrator, narrator-character or character focaliser's perspective.

Within the fields of stylistics and narratology, first person narration has often been considered an effective portal of sorts for the reader to conceptually transport themselves into the world of the story. Monika Fludernik's claim that "the interlocutor's 'I' leads to [...] an effect of vicarious experience" (1996, 71) and Lesley Jeffries' argument that "the use of first person in a narrative both identifies the narrator and also provides a perspective for the reader to enter the text world" (2008, 71) capture common opinion on this point. However, the effects of the second person pronoun in texts are sometimes described similarly. Consider, for example, Katie Wales' comment: "The you of a singer's 'I love you' ballad may well be fictional, but the audience will often (separately!) identify themselves with this personage" (1996, 72) (note that Wales interestingly doesn't make this claim about the 'I' of the singer's ballad). Irene Kacandes discusses an "irresistible invitation" to identify with the 'you', even if the reader is at the same time aware that the identification is somewhat "duplicitous", as in the case of specification of that 'you' conflicting with her own gender, attitude, behaviour, etc. (1993, 148-9), while Fludernik notes the pronoun's "decidedly involving quality" (1994, 286). Marie-Laure Ryan talks of "our instinctive reaction to think *me* when we hear *you*", and describes how "through this identification, the reader is figuratively pulled into the textual world and embodied on the narrative scene (unless, of course, the I-you communication is of the metafictional type, in which case the effect is a decentering)" (2001, 138; italics in original). Both 'I' and 'you', then, are perceived by theorists as having immersive, identification-inducing powers.

Empirical psycholinguistic and literary studies have offered several insights into the identification-inducing functioning of pronouns within narrative voice. Most of these experiments are underpinned by a situation model theory of language comprehension (Johnson-Laird 1983; van Dijk and Kintsch 1983) and later developments of these ideas in cognitive theory, moving towards theories of embodiment (de Vega et al. 2008). One line of experimental work indicates that readers recall deictic verbs of motion more easily if they are consistent with the established viewpoint of the protagonist (Black et al. 1979; corroborated by Rall & Harris 2000). This suggests that readers develop an embodied experience of the position of a character focaliser within a scene. In these tests, the character focaliser was designated in the third person, illustrating that reader-identification with a character focaliser is not limited to narration via the first and second person.

More recent partial corroboration and partial complication of these results occurs in the work of Tad T. Brunyé et al. (2009). This paper presents a pair of experiments involving narratives predominantly comprised of transitive processes in the present tense, to explore the impact upon perspective-taking of pronoun types (first, second and third person) and discourse contexts (manipulating the order of simple event sentences and sentences describing a character, for example). The authors describe readerly conceptual adoption of the protagonist's perspective as "internal", "embodied" perspective-taking, as opposed to "external" perspective-taking. Results of note are as follows: single-

sentence first and second person narrative tended to prompt internal, embodied perspective-taking, but in the second person more consistently than in the first; longer stretches of text in the second person tended to prompt internal, embodied perspective-taking, but in the first person tended to prompt external perspective-taking (cf. Sanford and Emmott 2012); third person narrative (in long or short texts) tended to prompt external perspective taking; “pronoun variation and discourse context mediate the degree of embodiment experienced during narrative comprehension” (Brunyé et al. 2009, 27); readers do not always embody the perspective of the actor performing an event; and evidence for consistent embodied perspective-taking was only apparent in narrative in the second person present tense. This is partially corroborated by Brunyé et al. (2011): comparing narratives in which the protagonist was designated as ‘you’ or ‘I’, this experiment generated results which indicated that “readers differentially represent narrative worlds as functions of perspective, developing richer spatial mental models of layouts and a greater internalisation of emotional events when directly addressed as a protagonist” – that is, as ‘you’ (659).

Brunyé et al. (2009; 2011) have focussed on text-involved transitive processes, predominantly exploring mental simulation of action. Descriptive sentences have been a lesser part of their experiments. While Brunyé et al. (2009) found that preceding an event sentence with a descriptive sentence did impact upon perspective-taking, the nature of that impact is not yet clear. Experimentation using other kinds of sentence types common in fiction is therefore warranted.

Erwin W. Segal et al. (1997) used modified versions of short stories to test the impact on readerly perspective-taking of past or present tense narration and first or third person narration, and found that results suggested that the psychological characteristics of the reader significantly influenced interpretation and involvement. The method of a post-reading questionnaire regarding interpretative stance facilitated results more revelatory of these aspects than of response to the deictic cues specifically. The results do, however, indicate an apparent relationship between narrative tense and readerly felt involvement, though Segal et al. found this relationship to be unclear.

The complex range of theoretical insights and mixed empirical evidence suggests further investigation is necessary. One crucial aspect of this investigation not yet foregrounded in experimental work is a delineation of the conventional relationships between a narrator and character. Debates about focalisation, relationships between ‘who sees’ and ‘who speaks’, and ways of conceptualising these relationships, continue, and proponents of Ann Banfield’s (1982) ‘no-narrator’ thesis remain vocal. For the purposes of this experiment, and with the caveat that many textual and contextual factors influence readerly adoption of positions within texts (Nünning 2014; Stockwell 2009), this paper is founded on a broadly cognitive grammatical approach (Langacker 2008; Talmy 2000) and sees focalisation as follows. A narratorial voice is constructed as such partially through deictics (e.g., personal pronouns and markers

of tense) anchored to that narrator's perspective. A narrator is the primary focaliser in a narrative, and can be more or less overt depending on the frequency and density of deictic cues anchored to that narrator's perspectival position, along with the frequency and density of evaluative language conveying attitudinal stance, marked style of expression, etc. A character may function as a secondary focaliser if the narrator partially conveys the story through the perspective of that character (e.g., using some deictics anchored to that character's perspective). In such circumstances, the character can be described as a character focaliser. In the case of first person present tense narration, the roles of the narrator and the character focaliser conflate into what can be termed a narrator-character. In first and second person narration, the first and second person pronouns, respectively, can be used to refer to any and all of these roles.

Within second person narration (which tends not to primarily employ the 'general' function of 'you'), the pronoun 'you' can designate a fictional protagonist other to (i.e., 'othered' by) the narrator, or can function as narratorial self-address (Herman 2004). In either case, the 'you' entails a covert narrating 'I', from which the 'you' is othered.

In cases of first person past tense narration, and in second person past and present tense narration, then, two distinct narratorial and character focaliser entities are involved, the reader having to conceptually shift through the former to reach the perspectival vantage point of the latter, while in first person present tense narration these roles are combined in the single entity of narrator-character. In testing the parameters which impact upon a reader's conceptual adoption of the perspective of 'the character' in the experiment outlined below (as is the case in most of the experiments detailed above), what is actually being tested is the reader's conceptual adoption of the perspective of a character focaliser – in theory, via the primary focalising perspective of a narrator – or of a narrator-character, specifically (Macrae 2012).

In second person narration, the 'you' carries an added conceptually jarring effect in being inherently "doubly deictic" (Herman 2004, 363-8). It is unavoidably "apostrophic", reaching 'out' of the text's fictional ontology to address the reader. This evokes the same "decentering" effect Ryan describes, though it is not, as she argues, specific to metafictional second person alone but rather inherent in all fictional uses of 'you' (cf. 2001, 138). The 'you' is duplicitous in its apostrophic address, by simultaneously addressing both one individually and an anonymous plurality. It is also not only apostrophic: it is simultaneously diegetic, in designating a fictional character. These factors, combined with the relative rarity and so jarring nature of second person fiction, are likely to prime the reader's real-world context and make overt to her the fact of her reading fictional discourse, and therefore obstruct immersion more than in the case of first person narration.

This delineation of fictional roles and ontological positions offers some depth and cohesion to the foundations for hypotheses of perspective-taking and conceptual immersion. However, the deixis of primary and secondary fo-

calisation, and related cues which might shift a reader between the perspectival vantage points of either or ‘pop’ them out of the fictional discourse altogether (Duchan et al. 1995), is complex, and bound up with other aspects of construal. An experiment testing these aspects of focalisation effects needs to carefully control not only the relative profiling and density of deictic cues anchored to each of the primary and secondary focalisers (when both are involved), but must also moderate a range of other cognitive grammatical contributors to the dynamic development of mental imagery. These include the focal prominence of objects and entities; the visual scope and granularity of described setting; and the availability of paths of conceptual mental scanning, shaped by the structuring of sentences (determining the sequential mental accessing of information) (Langacker 2008; Talmy 2000).

2. Experiment

With these ideas and this previous research in mind, the experiment was designed to test the following hypotheses:

1. Person deixis impacts upon conceptual perspective-taking;
2. First person narratives are more likely to elicit readerly conceptual identification with the viewpoint of the narrator-character or character focaliser designated by ‘I’ than second person narratives are with the narrator-character or character focaliser designated by ‘you’;
3. Temporal deixis impacts upon conceptual perspective-taking;
4. Given a first or second person narrative, a reader is more likely to conceptually identify with the viewpoint of the narrator-character or character focaliser if the narration is in the present tense than if the narration is in the past tense.

A pilot experiment was run with two phases. 30 participants first read one extract of a short fictional scene-setting text in one person and tense combination (i.e., I or you in present or past tense), and then provided a short written description of what they visualised (if anything). The participants then read a second extract describing a different scene and using a different person and tense combination, and selected from a range of images that which most closely matched what they visualised (again, if anything). The results were sufficiently statistically significant to warrant a larger experiment.

The current experiment involved 129 participants aged between 18 and 80, all of whom were native speakers of English with no expertise in stylistics or cognitive narratology. Four variants of a short replica of a passage of literary narration were created, in which a character moves through a landscape. The text is comprised predominantly of route description with the character involved in intransitive processes (such as walking, climbing, etc.). Each variant

text is identical but for its use of either the first or second person narrative mode in either the present or past tense (see Appendix 1 for variant (1), in the first person and present tense). The text exhibits tightly controlled cognitive grammar, along with a near-absence of characterisation so as to avoid potentially alienating effects.

The text is divided up into five sections of a paragraph each. Each variant was read by between 30 and 34 participants.

Following an instruction page and a tutorial (modelling one round of the main experiment, to allow the participant to practice the process), the participant is presented with the following: The text screen presents a paragraph of the text variant, positioned centrally on the screen. Beneath this is a button labelled 'Finished reading' which the participant clicks on to confirm completion of reading and to be taken to the next screen.

The filter screen then presents a set of options (in the form of buttons) describing the vantage point from which the participant visualised the scene. The choices are: Distance from character: 'close', 'mid', 'far' or 'don't know'; Height: 'bird's eye', 'character's eye level', 'elevated' or 'don't know'; 'Character's view point'; or finally 'No image' for cases in which the participant did not visualise anything. The filter screen serves to narrow down the number of images which are subsequently presented to the participant. Having clicked on the relevant buttons, the participant next clicks on the button labelled 'Show the gallery'.

The image gallery then presents a range of CGI-rendered images of the scene from angles corresponding to those selected at the filter screen stage. The participant clicks on the image which most closely portrays what she visualised while reading the text (if she visualised anything). The filter option buttons from the previous screen are available at the top of the screen if the participant wishes to amend her prior selection. The image gallery always also includes an 'n/a' box in case the participant decides at this stage that nothing was visualised.

The images are designed to employ as little potentially alienating detail as possible, and to that end portray a fairly androgynous (although more masculine than feminine) figure as the character. There is a set of 30 images corresponding to each text paragraph (identical across variants), picturing the scene from different points of view, including from the character's point of view, facing the character, to the side of the character, behind the character, above the character, and from points at various angles and distances from the character.

This read-filter-select process is repeated five times. The paragraphs of text varying in length to retain interest, and progress through a narrative description of the character moving through the landscape. Whichever tense and narrative person combination the participant has been allocated, this is maintained throughout all five paragraphs. After the fifth round, the participant is presented with a short questionnaire recording their age and details regarding their computer game playing habits, reading habits, TV and film preferences and the

like (the sex of the participant is entered into the data prior to allocation of a text variant).

3. Results

This analysis focusses on whether or not the participant selected the character's point of view as most closely matching their own conceptual vantage point at each of the five points she was given that choice. The data is broken down according to the number of opportunities for selection of the character's viewpoint or otherwise during the experiment (five per participant), rather than according to the number of individual participants (or according to responses grouped in relation to individual participants' choices). The statistical results of 2 x 2 chi-squared analyses of different variables (first person vs. second person, present tense vs. past tense, and factorial combinations), whereby $df = 1$ and $p \leq 0.05$, are described below. For fuller descriptive statistics, including proportions, standard errors and confidence intervals, please see Appendix 2.

In comparing the conceptual perspective-taking of participants who read a first person variant (in past or present tense) with those who read a second person variant (again, in either tense), the results revealed little difference between the tendency of either to adopt the character's point of view or to adopt a perspective external to the character. A chi-squared test revealed that the difference between the two groups (first or second person) in perspective-taking was not statistically significant ($\chi^2 = 0.07$, $p\text{-value} = 0.80$). This suggests that a relationship between use of first or second person narrative mode and whether or not a reader conceptually adopts a narrator-character or character focaliser's perspective is unlikely.

In comparing the conceptual perspective-taking (corresponding with the character's or not) of those who read a present tense variant (in either the first or second person narrative mode) with those who read a past tense variant (again, in either mode), the chi-squared test revealed a statistically significant difference ($\chi^2 = 17.37$, $p\text{-value} = 0.0000$). This result suggests that it is highly likely that, given a narrative written in the first or second person, whether or not a reader conceptually adopts a narrator-character or character focaliser's point of view is dependent on whether the narrative is written in the past or present tense. The detail of the chi-squared test, combined with the basic count data, reveals that there were significantly more instances of participants' selected the character's point of view in the present tense group, and significantly fewer in the past tense group (relative to the statistically expected figures).

To explore this result further, to investigate whether or not the difference lies predominantly in the behaviour of any particular sub-group, a series of additional chi-squared tests were performed. The behaviour of male and female participants did not, overall, differ significantly ($\chi^2 = 0.24$, $p\text{-value} = 0.63$), nor did they vary significantly in the cases of most of the person

and tense combinations. However, the tests did reveal a statistically significant difference in the behaviour of the male and female participants given variants written in the second person and in the present tense ($\chi^2 = 5.88$, p -value = 0.02). This suggests that there is a high probability that, given a narrative written in the second person and present tense, the likelihood of the reader adopting the character's perspective is influenced by their sex. The detail of the chi-squared test (comparing expected frequencies to observed frequencies) suggests that males, in particular, are more likely to conceptually adopt the perspective of a narrator-character or character focaliser in this narratorial mode than is statistically predicted.

4. Discussion

These results add significant data to the growing body of empirical research on focalisation and perspective-taking. The first hypothesis, that person deixis impacts upon conceptual perspective-taking, is not convincingly supported or contradicted by the data, as the significance of person in combination with the present tense upon reported conceptual identification with the character's perspective is marked. And yet, the data does convincingly contradict the second hypothesis, that first person narratives are more likely to elicit readerly conceptual identification with the viewpoint of the narrator-character or character focaliser designated by 'I' than second person narratives are with the narrator-character or character focaliser designated by 'you'. These results perhaps suggest that if the potentially alienating and jarring effects of 'you' as described above obtain, they are counter-balanced by inherent engaging properties, at least to the same extent that in the comparative case of first person narration, the cognitive demands of focalisation through a secondary character focaliser via a conceptual path through the primary narrator focaliser are off-set by *its* engaging and identification-inducing properties.

Strategic employment of second person address in political rhetoric, advertising and other discourse contexts is suggestive of a belief in its powers to elicit addressee-identification with that deictically-determined position (Macrae 2015). Many postmodern and contemporary literary experimentation with the second person narrative mode constructively exploit the apparent deictic paradoxes and ambivalence of the 'you' for interesting readerly effects. And yet, these results suggest that in narrative contexts 'you' may be no more immersion-inducing than 'I'. If ideas about "the you effect" (Trush 2012) are to be revised, in relation to particular discourse contexts, at least, further empirical investigation to advance understanding of its workings may be welcome in several quarters.

The results support the third and fourth hypotheses, that temporal deixis impacts upon conceptual perspective-taking, and that, given a first or second person narrative, a reader is more likely to conceptually identify with the view-

point of the narrator-character or character focaliser if the narration is in the present tense than if the narration is in the past tense. This result can perhaps be explained by the foregrounding of the deictic position of the narrator, as the intermediary primary focaliser looking back on the story scene, through which the reader's conceptual path may be directed to travel. The deictic markers of tense in the text, anchored to the narrator's retrospective perspective, may, perhaps in an oscillating or toggling fashion, pull the reader's perspective-taking away from the character within the scene and towards the narrator's mediating perceptual position. This data builds on the work of Segal et al. (1997) and begins to clarify the apparent interrelations between person and tense in focalisation.

There are a number of factors which need to be considered with respect to the experiment's results. Due to the difficulty of a within-subject experiment design of this type, a between-subject experiment design was employed. A within-subject design rules out the potential confounding factors of participants' *a priori* tendencies to take a particular perspective, whatever the circumstances or textual cues, *a priori* personal capacities or tendencies in terms of visual imagination (e.g. level of detail, vividness, strength of contribution of personal memory), empathic capacities and tendencies, comprehension capacities, experience of immersive CG environments (in first person 3D gaming, for example). If an appropriate within-subject experiment design could be achieved, the results may be more powerful.

Another significant issue to be considered is the frequency and points of participant response. Though text processing and imaginative conceptualisation is dynamic, the participant is asked to select only one 'closest matching' image at only one juncture after several phrases or sentences. The participant must therefore choose which point of their dynamic conceptual perspectival path to report as the 'one' perspective which most closely matches what they visualised (if anything). This may in itself invite a kind of summary scanning, and may distort the results.

An array of perhaps more minor, and more common, complications exist. Interruption of the reading process to report visualisation inevitably creates an unnatural reading experience, and unusual consciousness of reading and visualisation processes. While the variation in length of the paragraphs is justified to retain interest, the paragraphs consequently vary in their processing demands, which in turn can impact upon ease and manner of conceptual visualisation (e.g. more dynamic or more summary scanning in nature) and so impact upon perspective-taking. A more sophisticated experiment design would have afforded randomisation of the order of the perspective filtering choices on the filter screen, and of arrangement of images in the image gallery, to help to avoid particular options being foregrounded and selections being made based on the nature or screen positions of previous choices. The partial influence of previous choices on subsequent decisions is, though, hard to avoid. Similarly hard to avoid (though limited somewhat by the filtering process) is the interference of the presentation of multiple images on the gallery screen, requiring

selection by comparison, the participant therefore being lead to attend to and toggle between different images, potentially distorting responses. The images themselves are also representative rather than realistic. Any depiction risks being alienating in its specificity, and even the most non-gendered figure is likely to be alienating in its very androgyny. As experiment design develops, some of these issue may be addressed, enabling testing to become more rigorous and data more reliable.

A number of theoretical caveats warrant consideration too. One such caveat relates to possible variation between different kinds of reading in readerly experience and conceptualisation. There is evidence to suggest that different kinds of reading tasks and activities (e.g., ‘light’ reading for pleasure vs. ‘close’ reading for comprehension) invite different kinds of reading strategies, resulting in different kinds of cognitive activity (Burke 2011; Phillips 2015). Anthony J. Sanford and Catherine Emmott identify “an underspecified mental representation of the text” as a consequence of “shallow processing” (2012, 104), and argue that second person address forms may invite more attentive and deeper processing (cf. 173). The kinds of reading behaviours captured in the context of a research experiment may not be representative of the full variety or the most usual of behaviours. It is also likely that reading strategies vary according to genre- and text-type based expectations of style, plot structures and more (compare, for example, the reading behaviours one might adopt in reading a detective novel and a romance novel, a poem and a digital literary hypertext, a paragraph of scene-setting description and a paragraph of conversation between characters, or a short story and an instruction manual). It is likely that the effects of person, in particular, vary with the nature of the text (hence the comparative explorations of Brunyé et al. 2009).

The experiment design also focusses on mental imagery with a visual bias and without due attention to the potential contribution of other sensory cues in evoking a sense of felt conceptual immersion. As understanding of mirror neurons and other aspects of cognitive embodiment in reader response grows, and as the technological affordances of multimodal texts and multisensory augmented and virtual reality scenarios develop, so too will interest in and understanding of the roles of multisensory cues in imaginative perspective-taking. This will usefully add to a body of research which has up to now often focussed more on motoric factors (e.g. Brunyé et al. 2009; 2011).

The focus on mental imagery entails another important caveat. The term focalisation has been used here to distinguish the topic from other notions of perspective. While there is diversity of theoretical opinion on the nature of focalisation, such debates sit within wider and yet more varying views on perspective in its more expanded, psychological sense (i.e., including reader and character attitudes, beliefs, and so on) and on perspective-taking in relation to empathy and ideological identification (cf. Nünning 2014, 194). The experiment texts contained no marked characterisation precisely to delimit, as far as possible, the factors influencing readerly imaginative positioning, and to constrain the focus to embodied and visual elements, so as to more effectively iso-

late the effects of pronouns and tense. However, in literary narrative, focalisation is inherently imbued with other elements of perspective, albeit more or less explicitly depending on the nature of the narrative at any particular instance.

Lastly, the experiment design, and the related theoretical and empirical research upon which this study is based, assumes that perspective-taking in imagining fictional worlds is a matter of serial processing and singular perspective-taking. A challenge to this assumption is the growing theoretical sensitivity to the non-linear nuances of processing and conceptualisation, and, relatedly but more radically, the concept that it may be possible for participants to conceptually construct and maintain multiple perspectives simultaneously. Such a view would significantly heighten the complexities of attempting to capture dynamic readerly conceptualisation, but could throw new light on dominant ideas regarding embodiment and construal.

5. Conclusion

The results of the experiment reported here suggest that tense is a more significance factor than person with respect to whether or not a reader conceptually identifies with the visual perspective of the narrator-character or character focaliser in a fictional narrative scene. As is suggested by the theoretical discussions and reviews of past related experiments, further empirical exploration of the interrelations between tense and person is warranted, in the context of broader theoretical advancements in understanding of embodied cognition.

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Appendix 1

(1) A wide, grassy ledge runs along the cliff face, from which a couple of narrow, stepped paths stagger downwards to the sea. I walk along the ledge in the sunlight. The sheer rock-face cascades downwards at my left to meet the green platform beneath my feet, and falls down again, further, to the right, to confront the rush of the gently beating waves below. An old, abandoned row boat lies on the ledge ahead. Beyond that, at the end of cove, stands a lighthouse.

(2) I carry on forwards, following the ledge towards the lighthouse, and soon come upon the small wooden boat on my left, tilted, resting against the cliff face.

(3) I walk on, towards where the lighthouse stands ahead, against the sky, at the edge of the precipice, before the cliff drops away into the ocean. Arriving at the foot of the tall, white tower, I find a set of steps curving upwards around its outside wall.

(4) I climb up the steps. After a dozen or so, they stop. In front is an open doorway, leading into the darkness of the inside of the lighthouse.

(5) After a long climb, ascending the steps around the tower's windowless inner walls, I reach the top and step out into the sunlight again. I walk around the giant, caged, rippled bulb, dimmed in the brightness of the day. I stand at the railings and look out, above the rocky outcrops, across the wide expanse of glittering sea.

Appendix 2

Please note, in the descriptions below, 'C'sPoV' refers to 'the character's point of view'.

Testing person variable

Null hypothesis Ho: There is no significant difference in proportion of subjects in the I condition selecting C'sPoV and proportion of subjects in the you condition selecting C'sPoV ($P1 = P2$).

Alternate hypothesis H1: There is a significant difference in proportion of subjects in the I condition selecting C'sPoV and proportion of subjects in the you condition selecting C'sPoV ($P1 \neq P2$).

Estimate of proportion of subjects in the I condition selecting C'sPoV is $p1 = 146/325 = 0.4492$.

Standard error of the estimate of the proportion $SE(p1) = \sqrt{p1(1-p1)/n1} = 0.0276$.

Estimate of proportion of subjects in the You condition selecting C'sPoV is $p1 = 147/320 = 0.4594$.

Standard error of the estimate of the proportion $SE(p2) = \sqrt{p2(1-p2)/n2} = 0.0279$.

Estimate of the difference in proportions $p1 - p2 = -0.01014$.

Estimate of common pooled proportion (under the null hypothesis that there is no significant difference in proportions) is $p = (146 + 147) / (325 + 320) = 0.4543$.

Standard error of the difference in proportions $SE(p) = \sqrt{p(1-p)(\frac{1}{n1} + \frac{1}{n2})} = 0.0392$.

Therefore, 95% confidence interval for difference in proportions $P1 - P2$ is $-0.0101 \pm 1.96(0.0392)$.

95% CI for difference in proportions is $(-0.087, 0.0667)$.

95% CI for difference in proportions contains zero. Therefore, it is concluded that there is no significant difference between the two proportions.

Testing tense variable

Null hypothesis Ho: There is no significant difference in proportion of subjects in the present tense condition selecting C'sPoV and proportion of subjects in the past tense condition selecting C'sPoV ($P1 = P2$).

Alternate hypothesis H1: There is a significant difference in proportion of subjects in the present tense condition selecting C'sPoV and proportion of subjects in the past tense condition selecting C'sPoV ($P1 \neq P2$).

Estimate of proportion of subjects in the present condition selecting C'sPoV is $p1 = 183/345 = 0.5304$.

Standard error of the estimate of the proportion $SE(p1) = \sqrt{p1(1-p1)/n1} = 0.0269$.

Estimate of proportion of subjects in the past condition selecting C'sPoV is $p1 = 110/300 = 0.3667$.

Standard error of the estimate of the proportion $SE(p_2) = \sqrt{p_2(1-p_2)/n_2} = 0.0278$.

Estimate of the difference in proportions $p_1 - p_2 = 0.1638$.

Estimate of common pooled proportion (under the null hypothesis that there is no significant difference in proportions) is $p = (183 + 110) / (345 + 300) = 0.4543$.

Standard error of the difference in proportions $SE(p) = \sqrt{p(1-p)(\frac{1}{n_1} + \frac{1}{n_2})} = 0.0394$.

Therefore, 95% confidence interval for difference in proportions $P_1 - P_2$ is $0.1638 \pm 1.96(0.0394)$.

95% CI for difference in proportions is (0.0867, 0.2409).

95% CI for difference in proportions does not contain zero. Therefore, it is concluded that there is a significant difference between the two proportions. More precisely, proportion of subjects in present condition selecting C'sPoV is significantly higher than subjects in past condition.

Testing sex variable

Null hypothesis H_0 : There is no significant difference in proportion of male subjects selecting C'sPoV and proportion of female subjects selecting C'sPoV ($P_1 = P_2$).

Alternate hypothesis H_1 : There is a significant difference in proportion of male subjects selecting C'sPoV and proportion of female subjects selecting C'sPoV ($P_1 \neq P_2$).

Estimate of proportion of male subjects selecting C'sPoV is $p_1 = 112/240 = 0.4667$.

Standard error of the estimate of the proportion $SE(p_1) = \sqrt{p_1(1-p_1)/n_1} = 0.0322$.

Estimate of proportion of female subjects selecting C'sPoV is $p_2 = 181/405 = 0.4469$.

Standard error of the estimate of the proportion $SE(p_2) = \sqrt{p_2(1-p_2)/n_2} = 0.0247$.

Estimate of the difference in proportions $p_1 - p_2 = 0.0198$.

Estimate of common pooled proportion (under the null hypothesis that there is no significant difference in proportions) is $p = (112 + 181) / (240 + 405) = 0.4543$.

Standard error of the difference in proportions $SE(p) = \sqrt{p(1-p)(\frac{1}{n_1} + \frac{1}{n_2})} = 0.0406$.

Therefore, 95% confidence interval for difference in proportions $P_1 - P_2$ is $0.0198 \pm 1.96(0.0406)$.

95% CI for difference in proportions is (-0.0597, 0.0993).

95% CI for difference in proportions contains zero. Therefore, it is concluded that there is no significant difference in two proportions. Sex and selection of C'sPoV are independent.

Testing sex, first person and present condition

Null hypothesis H_0 : There is no significant difference in proportion of subjects in male I present condition selecting C'sPoV and proportion of subjects in female I present condition selecting C'sPoV ($P_1 = P_2$).

Alternate hypothesis H1: There is a significant difference in proportion of subjects in male I present condition selecting C'sPoV and proportion of subjects in female I present condition selecting C'sPoV ($P1 \neq P2$).

Estimate of proportion of subjects in male I present condition selecting C'sPoV is $p1 = 35/70 = 0.50$.

Standard error of the estimate of the proportion $SE(p1) = \sqrt{p1(1-p1)/n1} = 0.0598$.

Estimate of proportion of female subjects selecting C'sPoV is $p1 = 56/105 = 0.5333$.

Standard error of the estimate of the proportion $SE(p2) = \sqrt{p2(1-p2)/n2} = 0.0487$.

Estimate of the difference in proportions $p1 - p2 = -0.0333$.

Estimate of common pooled proportion (under the null hypothesis that there is no significant difference in proportions) is $p = (35 + 56) / (70 + 105) = 0.52$.

Standard error of the difference in proportions $SE(p) = \sqrt{p(1-p)(\frac{1}{n1} + \frac{1}{n2})} = 0.0771$.

Therefore, 95% confidence interval for difference in proportions $P1 - P2$ is $-0.0333 \pm 1.96(0.0771)$.

95% CI for difference in proportions is $(-0.1844, 0.1178)$.

95% CI for difference in proportions contains zero. Therefore, it is concluded that there is no significant difference in two proportions. Male I present and Female I present condition and selection of C'sPoV are independent.

Testing sex, first person and past condition

Null hypothesis Ho: There is no significant difference in proportion of subjects in male I past condition selecting C'sPoV and proportion of subjects in female I past condition selecting C'sPoV ($P1 = P2$).

Alternate hypothesis H1: There is a significant difference in proportion of subjects in male I past condition selecting C'sPoV and proportion of subjects in female I past condition selecting C'sPoV ($P1 \neq P2$).

Estimate of proportion of subjects in male I past condition selecting C'sPoV is $p1 = 17/55 = 0.3091$.

Standard error of the estimate of the proportion $SE(p1) = \sqrt{p1(1-p1)/n1} = 0.0623$.

Estimate of proportion of subjects in female I past condition selecting C'sPoV is $p1 = 38/95 = 0.40$.

Standard error of the estimate of the proportion $SE(p2) = \sqrt{p2(1-p2)/n2} = 0.0503$.

Estimate of the difference in proportions $p1 - p2 = -0.0909$.

Estimate of common pooled proportion (under the null hypothesis that there is no significant difference in proportions) is $p = (17 + 38) / (55 + 95) = 0.3667$.

Standard error of the difference in proportions $SE(p) = \sqrt{p(1-p)(\frac{1}{n1} + \frac{1}{n2})} = 0.0817$.

Therefore, 95% confidence interval for difference in proportions $P1 - P2$ is $-0.0909 \pm 1.96(0.0817)$.

95% CI for difference in proportions is (-0.2509, 0.0691).

95% CI for difference in proportions contains zero. Therefore, it is concluded that there is no significant difference in two proportions. Male I past and Female I past condition and selection of C'sPoV are independent.

Testing sex, second person and present condition

Null hypothesis Ho: There is no significant difference in proportion of subjects in male you present condition selecting C'sPoV and proportion of subjects in female you present condition selecting C'sPoV ($P1 = P2$).

Alternate hypothesis H1: There is a significant difference in proportion of subjects in male you present condition selecting C'sPoV and proportion of subjects in female you present condition selecting C'sPoV ($P1 \neq P2$).

Estimate of proportion of subjects in male you present condition selecting C'sPoV is $p1 = 40/60 = 0.667$.

Standard error of the estimate of the proportion $SE(p1) = \sqrt{p1(1-p1)/n1} = 0.0609$.

Estimate of proportion of subjects in female you present condition selecting C'sPoV is $p1 = 52/110 = 0.47$.

Standard error of the estimate of the proportion $SE(p2) = \sqrt{p2(1-p2)/n2} = 0.0476$.

Estimate of the difference in proportions $p1 - p2 = 0.1939$.

Estimate of common pooled proportion (under the null hypothesis that there is no significant difference in proportions) is $p = (40 + 52) / (60 + 110) = 0.5412$.

Standard error of the difference in proportions $SE(p) = \sqrt{p(1-p)(\frac{1}{n1} + \frac{1}{n2})} = 0.0799$.

Therefore, 95% confidence interval for difference in proportions $P1 - P2$ is $0.1939 \pm 1.96(0.0799)$.

95% CI for difference in proportions is (0.0372, 0.3507).

95% CI for difference in proportions does not contain zero. Therefore, it is concluded that there is a significant difference in two proportions. Precisely, proportion of male you present condition selecting C'sPoV is significantly higher than proportion of subjects in female you present condition. Male you present and Female you present condition and selection of C'sPoV are not independent.

Testing sex, second person and past condition

Null hypothesis Ho: There is no significant difference in proportion of subjects in male you past condition selecting C'sPoV and proportion of subjects in female you past condition selecting C'sPoV ($P1 = P2$).

Alternate hypothesis H1: There is a significant difference in proportion of subjects in male you past condition selecting C'sPoV and proportion of subjects in female you past condition selecting C'sPoV ($P1 \neq P2$).

Estimate of proportion of subjects in male you past condition selecting C'sPoV is $p_1 = 20/55 = 0.3637$.

Standard error of the estimate of the proportion $SE(p_1) = \sqrt{p_1(1-p_1)/n_1} = 0.0649$.

Estimate of proportion of subjects in female you past condition selecting C'sPoV is $p_2 = 35/95 = 0.37$.

Standard error of the estimate of the proportion $SE(p_2) = \sqrt{p_2(1-p_2)/n_2} = 0.0495$.

Estimate of the difference in proportions $p_1 - p_2 = -0.0048$.

Estimate of common pooled proportion (under the null hypothesis that there is no significant difference in proportions) is $p = (20 + 35) / (55 + 95) = 0.3667$.

Standard error of the difference in proportions $SE(p) = \sqrt{p(1-p)(\frac{1}{n_1} + \frac{1}{n_2})} = 0.0817$.

Therefore, 95% confidence interval for difference in proportions $P_1 - P_2$ is $-0.0048 \pm 1.96(0.0817)$.

95% CI for difference in proportions is $(-0.1648, 0.1552)$.

95% CI for difference in proportions contains zero. Therefore, it is concluded that there is no significant difference in two proportions. Male you past and Female you past condition and selection of C'sPoV are independent.

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