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PS6

Introduction

Over the last decade, psychologists have proposed that fiction promotes empathy and theory of mind in its readers. The nature of fiction is theorized to "simulate" these domains in the minds of those engaged in fiction literature. As storylines become more detailed and characters develop, the reader understands the emotions and mindsets described in the literature because they are feeling them as their own (de Vignemont & Singer, 2006). *Simulation* is theorized to be one route to development in empathy and theory of mind (Mar et al. 2006), and an appropriate conceptualization of reading fiction. However, the claims of Mar and colleagues has not been entirely reproduced in recent replication studies. Bal and Veltkamp (2013) offered that in order for changes in empathy to take place, an incubation period must take place first. In other words, effects of simulation would not be as common directly following a narrative reading experience, as it would after time has passed. During this elapsed time the reader will have been reliving and thinking more deeply about what they have read over time. For instance, engaging with unrelated tasks may improve one's problem solving ability (cite). Incubation in the context of reading implies that one will apply what they have connected with in literature to the real-world surrounding them, but this process takes considerable amounts of time. Bal and Veltkamp (2013) assessed increases in empathy in participants immediately following a fiction or non-fiction reading condition, and then one week later. Evidence of a sleeper effect, in which people scored higher on empathy scales one week later than immediately after reading a narrative, was found. We note that if effects can be seen this early after reading fiction, indeed it is possible to find more noticeable effects over longer periods of time. In our study, we sought to examine this claim using longitudinal data most appropriate for exploring the connection of reading with the development of empathy.

Neurological Evidence

In 1980 (check year), Giacomo Rizzolatti discovered that neurons would fire in the brains of monkeys watching other monkeys do things like reach for a bite of food, as if they were experiencing the event themselves. When the neurons fired in the brains of the watcher, they were said to be "mirroring" the perceived behaviors. Thus, *mirror neurons* are widely accepted as those that respond to observing the actions of another. Recent neuroimaging studies have examined mirror neurons in the context of empathy (cite). For example, (CITE) participants watched emotional films and showed activation in brain regions as if they were experiencing the events of the film. The mirror systems within our brains go along with Goldman's proposal of simulation theory mentioned earlier (2000). In relation to this study, mirroring brain systems could support our hypothesis. When reading fiction literature, it is highly possible that reader's affective brain regions are firing and mirroring the cognitions that are being perceived to take place within the characters of novels. Needs more.

Transportation and Narrative Mode

Gerrig (1993) highlighted the pervasiveness of entering a "narrative world," or storyline of a fictional text. He explains a process called *transportation,* in which narrative receivers travel into the world of a fiction novel (commonly referred to as "losing oneself in the book"). Readers may become absorbed into the story, in which they move farther away from their own reality, according to Gerrig. Through this, (cite) readers are able to change as a function of connecting with characters and the events that take place in the novel's "world." Bruner (1986) provided that in order for fiction reading to elicit fluctuations in personality (e.g. empathy), the reader must be transported into a narrative. The process of transportation is unlikely to happen in a nonnarrative or nonfiction work, as these typically lack protagonists, settings, and emotional events. Yet, some non-fiction novels do include these features deemed necessary by Gerrig to evoke transportation, and thus need to be distinguished when analyzing effects of certain types of literature on empathic development. Is it important to include this background if I am not testing transportation? Transportation is a possible mediating variable between reading fiction and increased empathy, but it is difficult to test and cannot be tested for this paper.

Theory of Mind and Agreeableness

Theory of mind (ToM) refers to "the cognitive capacity to attribute mental states to self and others," and furthermore, one's cognitive capacity to understand perceptions, beliefs, desires, hopes, and intentions of another (Goldman 2012). The concept behind this coined phrase is quite literal, to say that engaging in theory-of-mind is depicted by a person accurately theorizing about what is taking place in the mind of another person (e.g. mentalizing, mindreading). Nettle and Liddle (2008), further break down ToM into two subcomponents: *social-perceptual* and *social-cognitive* ToM. They explain that social-perceptual ToM would be best measured by the Mind in the Eyes Test (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), in which a participant must identify the correct mindset being expressed through referencing photos of people's eye regions. Social-perceptual ToM more specifically focuses on one's ability to judge the mental states of others based off of facial expressions or other available bodily indicators. Social-cognitive ToM speaks to the "ability to reason about the content of another's mental state and use that reasoning to predict or explain their actions," (Nettle & Liddle 2008). Tasks central to this aspect of ToM can involve participants being presented with narratives and then being asked to draw conclusions about the beliefs of the character(s). We predict that this ToM domain would more closely resemble what is referenced in past literature regarding fiction eliciting ToM in narrative receivers. Nettle and Liddle's study suspected a positive association between social-cognitive ToM and the Big Five personality dimension of *agreeableness.* The agreeableness dimension of personality is widely theorized to be associated with affective and cognitive empathy (Melchers, Li, Haas 2016), and thus is important to note. Needs more**

Past Research:

Past research has provided abstract evidence to support the promotion of empathy and theory of mind through reading. Furthermore, empathy and theory of mind have not been studied longitudinally, which would be essential in order to examine potential increases over

considerable periods of time. Another advantage our methods of studying empathy provide is a large sample size. Tens of thousands of reviews across 100,000 participants would, in theory, allow us to better analyze any change in empathy.

Our study:

We hypothesized that readers of fiction would increasingly use empathic words as they read more fiction books over time. To measure this predicted increase, we drew thousands of book reviews from Goodreads.com, where readers review books they've read. We used reviews from 100,000 reviewers (from 20,000,000 users). Our study sought an answer to the question: Does reading fiction increase empathy? We aimed to study empathic language used in a huge number of book reviewers over substantial amounts of time and discuss now how this method streamlines evidence in support of our hypothesis. We strive to provide objective evidence in support of the predicted phenomenon.

Empathy dictionary:

We created an empathy dictionary made of words that are theorized to be expressive of empathy. For instance, Haidt and Graham (2013) devised a moral dictionary corresponding to their proposed seven moral foundations. One foundation, *harm and care* characterizes empathy and nurturance, according to the authors. Thus, words from this dictionary were incorporated into the empathy dictionary for this study. We also drew from Saucier's 1997 research in which he identified familiar English adjectives that described people and used them to measure the different Big Five personality structures. The words he found to describe the trait of *agreeableness* were adopted in this study, as this dimension is theorized to be associated with affective and cognitive empathy (Mooradian, Davis & Matzler 2011) (Melchers, Li, Haas 2016). We added more words through referencing empathy surveys and through using a thesaurus to gather as many like words to empathy as possible. The Toronto Scale of Empathy and the Empathy Quotient are two examples of empathy surveys that we drew empathy-like words from. However, it is important to note that, although these words are likely to express empathy, not all people expressing empathy may necessarily be limited to these words.

Procedure

We requested permission from Goodreads.com and extracted reviews from its members using *Python* (a sophisticated programming language and software). Next the data were uploaded into *Stata*. We counted the number of words from our comprehensive empathy dictionary that appeared in each review, and then divided this sum by the total number of words in the review. This provided us with a proportion or percentage of empathic words per individual book review and allowed us to see any change in empathic language use over time. Goodreads.com does not require reviewers to leave a discussion as a part of their review and may just leave a 1-5 star ranking instead. These "missing" review values were discarded, and so

were reviews written in languages other than English. After accounting for these exclusionary criterion, 74,200 reviews remained and were examined. We then investigated whether the proportion of empathic language people wrote increased as they wrote more reviews through correlation (.0129). Should I just replace the information from Stata with R? Can we compare the agreeableness words separately too as exploratory investigation?

Using *R,* we discovered that the number of reviews written by people and their empathic language use indicated a significant relationship ($p<.01$). All data were loaded into *R,* and similar to the statistical regressions run in *Stata,* the proportion of empathy words were calculated and viewed across time and increasing number of written reviews. Through graphic visualization, we found a slight, but significant increase in empathic language as a function of writing more reviews.

Do I include the correlation we got from Stata? (.0129) and the significant $p<.01$ Dan got from R? Or just one of them… At first I am noting a correlation, and then I am noting evidence for causation, so I am stuck on what to do.

Limitations

A few limitations are worth noting. More statistical testing is needed to demonstrate if it is necessary for people to write about the books they've read, in order to reap the proposed benefits of reading fiction. More specifically, it is possible that mere elapsed time from reading fiction is the key component to fluctuations in empathy. In the data, there were cases in which writers were reviewing multiple books on the same days. We speculate that they were reading more books over time but writing about them all on one day. This factor fogs the lens through which we view the phenomenon of interest because it becomes difficult to gage the impact of writing reviews over time. Somehow work in that although the results are significant, are they psychologically significant? E.g. Do you have to reads hundreds of books to reap the benefits?

As mentioned earlier, we are only able to account for the words programmed into our empathy dictionary. There is definitely room for members to have expressed empathy through the use of language not examined here. And, it is possible that people using the words from our comprehensive dictionary are not truly representative of empathic intentions. However, the dictionary is as representative of empathy as possible according to the resources available in past research.

Working with such a large set of archival data does not allow for us to survey participants any further. Thus, it is not possible to gather further helpful information such as clarification of their reviews, or self-report measures concerning empathy and personality.

Discussion

Our central finding is that the proportion of words in reviews that appear in the empathy dictionary increase as a function of the number of reviews written. This finding suggests that reading fiction makes people more empathic and supports Bal and Veltkamp's notion that reading fiction is associated with change in empathy. And, that an incubation period yields more frequent instances of empathic language use in avid book readers and reviewers. Of course, our

findings are correlational, and do not demonstrate causality. More research is definitely needed to identify causal relations.

When readers are deeply absorbed in a novel they are reading, they may feel as though they are being *transported* into the realm or story being told. Some readers describe this feeling as "getting lost" in the book or say things like "I could not put this book down!" Gerrig theorizes that this phenomenon, coined *transportation,* occurs when people are reading narratives (1993). Beforehand in 1986, Bruner offered that in order for the effects of fiction on empathy to take place, one must be reading a narrative. He highlighted that a proper narrative includes relatable characters and believable settings and situations, as opposed to non-fiction novels lacking those aforementioned characteristics. Thus, as reviewers from our sample used language indicative of empathy at increasing rates, and as a function of reading more narratives, it is very possible that these readers were being transported into the novels. But, our study does not provide evidence for this and can only speculate the causal mechanisms behind the association that we did find. Is this part irrelevant now? There is more than correlational evidence.

R results….

Future Directions

- Transportation was not measured in this study, and its relationship to empathic development through fiction reading should be considered in future research.
- Personality should also be measured.
- Big data is very exciting, but it is unfortunate that we are unable to collect more personality and empathy data on these reviewer's (e.g. administering empathy surveys and Big Five self-report assessment)
- On the other hand, we get more objective evidence and do not have to account for high demand characteristics, which are more prevalent when self-report tools are being used. People leaving reviews online are not under the impression that they are being scored or studied and are more likely to behave genuinely [or true to themselves] than if they were aware that their reviews were being studied.