THE EFFECTS OF INTERACTIVITY AND VISUAL REALISM ON CHILDREN'S COGNITIVE EMPATHY TOWARD NARRATIVE CHARACTERS

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The focus of this dissertation is how to support observational learning of social reasoning from narrative characters. In view of the mediating role of cognitive empathy in both observational learning and narrative engagement, the work was approached with a multi-stage conceptual framework synthesized from the domains of social cognitive theory (Bandura, 1986) and empathy (Davis, 1994). As a topic for research, the central role of presence in both cognitive empathy and contemporary media design, and the conceptualization of telepresence in terms of interactivity and immersion, suggested testing the effects of interactivity and immersion, specifically visual realism, on cognitive empathy toward narrative characters.

Study One took place in three fourth grade classrooms in a Midwestern town, recruited by convenience and using cluster assignment. Study Two took place in eight middle school classrooms in three countries, recruited by convenience and using random assignment. The materials were two original, illustrated hypertext stories, bearing the conceptual features of an interactive, immersive medium while still affording observational rather than participatory engagement. Study One tested the effects of interactivity by comparing print and hypertext versions of the stories. Study Two tested the effects of visual realism, conceptualized as informativeness and accuracy, by comparing hypertext versions illustrated with three different styles. Both experiments

used a between-subjects, posttest-only control group design. Children's perspective taking and fantasy identification were measured through questionnaires, and two intrapersonal empathy outcomes were measured through writing prompts. The questionnaire was adapted from existing instruments, and both measures demonstrated evidence of validity.

In Study One, interactivity was found to negatively affect fantasy identification and intrapersonal empathy outcomes, and as these represent subfunctions of observational learning, this suggests that, in the context of this study, for a reader positioned outside of a story, perceived agency may reduce the reader's sense of identification with characters and therefore reduce their effectiveness as social models. No other effects on empathy were found for interactivity, nor, in Study Two, for visual realism. These findings may inform the design of media to support cognitive empathy and observational learning of social reasoning, and the conceptual framework and instrumentation may inform related studies.

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Chapter 1:

Introduction

1.1 Overview

According to social cognitive theory, practically all learning that results from direct experience can also occur vicariously through observation of others, including learning not only behaviors but cognitive competencies such as forethought and social reasoning (Bandura, 1986; Harvey, Fletcher, & French, 2001; Keating & Clark, 1980). Still, the effectiveness of social models is dependent on their potential to support the processes of observational learning, the foundation of which involves cognitive empathy for the model. And while people in the natural world can serve as powerful models, social cognitive theory also emphasizes the influence of mediated models (Bandura, 1989, 1994), a view consistent with theories that we respond to media characters in a manner similar to real people (Reeves & Nass, 1996). The focus of this dissertation is on how to support observational learning of social reasoning from narrative characters introduced through designed media.

In Bandura's theory of observational learning, cognitive but not affective empathy figures centrally in the processes of modeling (1989, 1994, 2002b). The affective dimension of empathy is characterized by a loss of detachment of the self from the empathic object; in contrast, the cognitive dimension retains a self–other differentia tion, with different cognitive constructs describing that relationship in different ways (Davis, 1994; Eisenberg & Strayer, 1987; Hoffman, 2000). These constructs, including perspective taking and fantasy identification as well as empathy-related mental representations, situate one individual in relation to another and thus provide a way of

knowing (Preston & de Waal, 2002; Wispé, 1986). Narrative, too, affords a way of knowing (Mateas & Sengers, 2003; Pickstone 2000), so naturally, such empathy-related responses can also arise in relation to fictional characters (Harold, 2000; Keen, 2007) and in media contexts (Moeller, 1986; Shaivitz, 2003).

Indeed, narratives afford a substantial mode of engagement (Bruner, 1990; Keen, 2007), and this engagement can be supported by not only the media content but also the media design (Lacy, 1986; Murray 1997). The interest in media design in both media effects research (e.g., Bryant & Vorderer, 2006; Lang 1994) and the field of instructional technology (e.g., Clark, 2001; Mayer, 2001) suggests studying media design in relation to observational learning from narrative characters, and the central role of presence in both cognitive empathy (Nicovich, Boller, & Cornwell, 2005; Sas & O'Hare, 2003) and media design (Heeter, 1992; Lombard & Ditton, 1997; Tamborini & Skalski, 2006) suggests studying telepresence to understand this matter. More specifically, in media design, a sense of telepresence can be conceptualized in terms of interactivity and immersion (Steuer, 1995; Ryan, 2001), where interactivity refers to one's participation with the media (Heeter, 2000; Jensen, 1998), and immersion refers chiefly to the realism of the media (Heeter, 1992; Ryan, 1994; Sheridan, 1992) or, more narrowly, its visual realism. Therefore, the questions addressed in the present research concern how interactivity and visual realism can support observational learning from narrative characters.

A wide range of media afford empathic relations with narrative characters, from plain text to television, from role-play games to virtual reality, but one particular form or genre may best illuminate the present work, namely the visual novel. While instantiated in various forms, the visual novel is generally characterized as an electronic medium with

text and graphics, and perhaps sounds; a linear narrative arc, perhaps branching; and a protagonist in a natural social situation, whose experiences the reader can observe, and perhaps occasionally direct (Ronen, 2008). It is unlike first-person game narratives, for example, that afford such a range and depth of embodiment as to unsettle an observational stance and confound experimental research.

The materials used in this research—illustrated hypertext stories—bear all of the aspects conceptually defining an interactive, immersive narrative medium while still bearing comparability to a less interactive, less immersive one. And the visual novel suggests both the effectiveness of this genre in teaching social reasoning (Laurel, 2001; Taylor, 2007) and the feasibility and appeal of these design features (AMN and Anime, 2006; Dela Pena, 2006; Moe Market, 2008). Therefore, this research concerns observational learning from media characters and ensues from two premises: that observational learning depends on cognitive empathy for the characters; and that the design of the media may significantly affect their modeling potential. In particular, this research investigated the effects of interactivity and visual realism for supporting cognitive empathy.

1.2 Statement of the Problem

Given this goal to understand how media can foster cognitive empathy and subsequent modeling of forethought and social reasoning, the design decisions underlying material development must be informed by the mechanisms underlying observational learning. In observational learning, a model's enduring influence on one's own attitudes, emotions, and behavior takes place beginning with observing another's

behavior and understanding their experience. To support effective modeling, media must afford these empathic stances, but which media forms most effectively do so? The argument for a traditional literature-based program for social reasoning is readily supported (Helwig, Tisak, & Turiel, 1990; Leming, 2000; Peck, 2002; Williams & Schaps, 1998). Still, contemporary children demonstrate a passion for media, especially interactive immersive media (Calvert, Jordan, & Cocking, 2002; Roberts, Foehr, & Rideout, 2005), so to employ such media as a narrative context may foster their interest, investment, and involvement (Jenkins, Clinton, Purushotma, Robinson, & Weigel, 2006; Unsworth, 2006). However, given the relative novelty of media affording extensive interactivity and immersion, their effects on cognitive empathy remain insufficiently understood.

Developers of multimedia narratives to foster observational learning must make numerous choices that potentially impact a reader's cognitive empathy—choices regarding not only the content but also the form or structure of the media. Among the range of design decisions to be considered (Lacy, 1986; Pitz, 1963), of contemporary interest is the question of interactivity, and of long-standing interest is that of visual realism, a central aspect of immersion. Indeed, though interactivity and visual realism are afforded by contemporary media to an unprecedented extent, their impact on cognitive empathy toward characters has not been sufficiently studied. As a result, many designers base their decisions on the availability or appeal of particular technologies rather on design knowledge.

1.3 Purpose of the Research

This research involved two experiments testing the effects of different forms of interactivity and visual realism on four cognitive empathy-related constructs for children. Study One investigated interactivity by contrasting a traditional, print-based picture book with an online hypertext format in which the reader ostensibly determined the narrative path at several branches in its course. The hypertext medium was identified as a means of introducing interactivity while still affording observational rather than participatory engagement. Study Two investigated visual realism by contrasting graphic styles exhibiting different extents of information and accuracy. Three different styles were developed as a means of independently varying different dimensions of visual realism in illustrated, print-based books. Both experiments presented children with a series of two brief narratives. After each narrative, children's cognitive empathy with the characters was evaluated through questionnaire and writing responses. Statistical analysis determined the effects of these structural variations on the children's cognitive empathy toward the narrative characters, and these results may inform the design of media as an efficacious means for supporting observational learning of social reasoning.

1.4 Theoretical Framework

The present research was conducted according to conceptualizations of its various constructs. As mentioned above, this research ensues from two premises, namely that (1) observational learning depends on cognitive empathy for the media characters; and (2) the structure of these media—in particular interactivity and visual realism—may affect their modeling potential. In terms of the studies themselves, the first premise

frames the research topic, that is, the learning outcomes or criterion variables of interest. Similarly, the second premise frames the conditions that may influence them, that is, the treatment or causal variables.

1.4.1 Framework for Research Topic & Outcomes

To research how to design for observational learning from narrative characters, an original framework was synthesized from the domains of social cognitive theory, social empathy, and educational assessment. The mediating role of cognitive empathy operating in both observational learning and engagement with narrative media suggested using a conceptual framework of empathy to research observational learning from narrative characters. Further, multi-stage models of outcomes used in both empathy research and educational assessment suggested using a multi-stage conception of empathy to research observational learning from narrative characters. Thus, *a multi-stage conception of empathy framed this research of observational learning from narrative characters.* These are the premises of the Integrated Model of Empathy for Observational Learning, an original framework for theory and research, explicated in the following chapter. A brief explanation of the conception of empathy follows.

Responding to characters in narrative media, we engage in natural patterns of response such as empathy (Keen, 2007; Zillmann, 1991), a multi-dimensional, multi-stage construct centered on understanding another's experiences (Davis, 1994; Eisenberg & Strayer, 1987). The dimensions of empathy involve both cognitive and affective constructs, so empathy broadly may be considered a conative construct, that is, positioned between cognitive and affective dimensions (Kuhl & Beckman, 1985, cited in Snow & Jackson, 1993, p. 3). Though different researchers conceptualize empathy in

different ways, a broadly accepted definition of the construct posits two cognitive dimensions, namely perspective taking and fantasy identification, and two affective dimensions, sympathy and emotional contagion, as the central processes that precede other empathy-related intrapersonal and interpersonal outcomes (Davis, 1983, 1994, 2006). The present research inquired into the cognitive processes of perspective taking and fantasy identification and the subsequent intrapersonal outcomes of empathy reflection and empathy projection.[1] This model for the commensurate measurement (Caplan, 1987; Rounds, Dawis, & Lofquist, 1987) of observational learning in terms of cognitive empathy represents a major theoretical, as distinguished from empirical, contribution of this research.

1.4.2 Framework for Research Treatments

The interest in media design shared by the fields of both media studies and instructional technology suggested studying media design in relation to observational learning from media characters. Thus, the research questions concerned how media design can support observational learning from narrative characters. Further, the central role of presence in both cognitive empathy and media design suggested studying presence to understand observational learning from media characters. To briefly elaborate, in media design, perceived presence is conceived of in terms of interactivity and immersion: the perception of interactivity refers to one's sense of agency or participation with the

[1] To be clear, the constructs of perspective taking, fantasy identification, sympathy, and emotional contagion (and various terms used interchangeably for these) are plainly extant in the literature, as are the cognitive and affective domains of empathy (e.g., Davis, 1994; Eisenberg & Strayer, 1987; Preston & de Waal, 2002). The Integrated Model of Empathy for Observational Learning is an original synthesis of the model of observational learning by Bandura (1989) and the organizational model of empathy by Davis (1994). This new model introduces two constructs—empathy reflection and empathy projection—that signify specific areas of overlap between the two models in order to scaffold and evaluate observational learning in terms of cognitive empathy. Indeed, given the surfeit of terms already confounding empathy research, their meaning and utility are expressly delimited to this purpose. These two constructs are defined below and explicated in the following chapter.

media, and that of immersion refers chiefly to the realism of the media or, more narrowly, the visual realism of the media. Thus, *a conception of media design as involving interactivity and visual realism framed the research questions concerning how media can support observational learning from narrative characters.* A brief explanation of these conceptions of media, interactivity, and visual realism follows.

Narrative & media. An appreciation of narrative, media, and responses to media characters informs this research. Central to human culture—and even understanding—is narrative, for which we have not only a propensity but an intelligence (Favat, 1977; Mateas & Sengers, 2003). Understanding of the world derives in part from the intersubjective semantic system sustained through culture (S. Hall, 1996; Lakoff, 1987; Vygotsky, 1986), so narrative, and media more broadly (Messaris & Abraham, 2001), may be regarded as technologies for constructing understandings. Functioning top-down, people construct meaning in terms of what they already know, but people also respond to the environment bottom-up (Driscoll, 2000; Winn, 1993), such that they bear a natural response to media as non-mediated stimuli (Reeves & Nass, 1996).

Much research has suggested how people process and interpret media, including conceptualizations of a dual-coding perceptual system (Paivio, 1986; Mayer, 2001) defining separate systems for processing visual (sensory) and verbal (semantic) information. Thus, the perception–cognition dialectic may include non-verbal media (Potter, 2001) and non-literate modes of thought (L. Johnson, 1999). Especially for multimedia such as picture books, we shift between perception and cognition, transforming sensory and semantic material, constructing meaning from the ecology of the media (Allen, Otto, & Hoffman, 2004; Lewis, 2001; Sadoski & Paivio, 2001).

Empathy, interactivity, & visual realism. Given the function of empathy as epistemological (Preston & de Waal, 2002; Wispé, 1986), that is, as a way of coming to understand the world, the cues we find in media significantly influence empathic response (e.g., Bourg & Stephenson, 1997; Calvert, Strouse, & Murray, 2006; Hoffner & Cantor, 1991). These cues derive from not only the content but also the form or structure of media; they may vary in scope and impact but, in media ranging from literary narratives to virtual reality, may be discussed in terms of interactivity and immersion (Steuer, 1995). Together, these comprise a general theory of representation (Ryan, 2001) describing both the perceptual–semantic content and the meaning one makes of it. Just as the above conceptions served to frame the learning outcomes, the following ones served to frame the particular research treatments.

To begin, interactivity, or participation with media, may be conceptualized in terms of the media structure and the media user. In the present research, interactivity is operationalized in terms of the media, namely print and branching hypertext, the contrast between which is interpreted as an index of the user's sense of agency with the media. With regards to the media, one can describe the extent to which the content is dynamic, determined, and transient; both print and branching hypertext are the same in these regards, with the surface content changing predictably at the reader's direction. Further, one can describe the access and linking: in simple hypertext, links are explicit and perhaps conditional and provide linear access to adjacent pages; in contrast, print books do not provide explicit links but afford unconditional, random access to pages. With regards to the user and her sense of agency or participation, one can describe the perspective, ranging from external or impersonal to the internal or personal, and the

function, ranging from interpretive to exploratory or, with dynamic content, more configurative ones (Aarseth, 1997, pp. 62–65). According to this typology, and though dependent also on the narrative voice, the *print* reader is situated as external and interpretive, and the *hypertext* reader may remain external but be more exploratory, as in the present media, or even more internal and configurative in participation, with more sophisticated media. The shift to an internal or personal stance may also be realized by media affording a sense of immersion.

To continue, immersion, or the apparent reality of the media, can likewise be conceptualized in terms of media structure and user perception. Importantly, the media need not represent how the world really is but only how such a world would appear if it were real (Abell, 2007; Shapiro, Peiia-Herborn, & Hancock, 2006; Steuer, 1995), so that immersion may refer to the evidence of reality either structurally or perceptually, and the present research concerns this aspect of immersion, that is, apparent realism. Further, while media content bear a semantic appeal, the structural attributes appeal to the senses with their claim to realism, and given the present research focus on illustrated narratives, perceptual realism may more specifically be discussed in terms of visual realism, excluding, for example, auditory and haptic systems. Accordingly, with regards to the media and as reflected in various definitions of immersion, realism is essentially a matter of information (Biocca, 1997; Reeves, Detenber, & Steuer, 1993; Steuer, 1995), and further, reflecting an uncommon distinction adopted by the present research, visual realism is conceptualized in terms of not only the amount of information about the world's appearance but also the extent of its accuracy relative to the world it represents (Abell, 2007; Hyman, 2004; Lopes, 1995). Thus in the present research, according to this

conceptualization, visual realism is operationalized in terms of the media: in contrast to a *semi-realistic* scene, a visually *simplified* scene is abstracted with a lesser extent of information, and a *painterly* scene is stylized with a lesser accuracy of information. These contrasts may be interpreted as indices of the user's sense of the visual realism of the media.

1.5 Hypotheses & Research Questions

The two experiments conducted for this research involved two different independent variables: interactivity and visual realism. Nonetheless, they both involved the same four dependent variables, at three temporal distances or levels from the treatment: at the close level, perspective taking and fantasy identification; at the first stage of the proximal level, empathy reflection; and the next stage of the proximal level, empathy projection. Both used the same series of two illustrated narratives implemented in the same form and fashion, apart from the treatment differences.

1.5.1 Study One: Effects of Interactivity

The first experiment investigated the effects of interactivity by comparing print and hyperlink versions of the narratives. Treatment effects were measured at the close level, on perspective taking and fantasy identification, through questionnaires; at the first stage of the proximal level, on empathy reflection, through a writing prompt; and the next stage of the proximal level, on empathy projection, also through a writing prompt. As will be shown, the literature suggests causal relationships between the variables, but since the direction of the effect remained uncertain, these relationships were posed as research questions rather than hypotheses.