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Towards Post-Cognitive E-Learning: Discursive Psychology and Educational Technology

Norm Friesen

Abstract

As an alternative to dominant cognitive-constructivist approaches to educational technology, this paper utilizes what has been termed a "discursive," or "post-cognitive" psychological research paradigm. It does so by adapting discursive and conversational analyses to the study of educational technology use. It applies these adapted techniques specifically to discursive interactions with "chat bots" or "intelligent agents," and to the theories commonly associated with them. In doing so, it presents a critique of notions of human-computer "indistinguishability" or "equality" as they have been articulated from Alan Turing (1950) to Reeves and Nass (1996), and it sketches an alternative account of the potential and limitations of this technology. In divergence from Turing and Reeves and Nass, human discourse generated through encounters with these "natural language interfaces" is seen as emphasizing the issue of "conversation" itself, foregrounding the achievement of common discursive aims and projects, rather than illuminating the internal states of either interlocutor.

Introduction

The current status of cognitive science in the fields gathered under the aegis of "e-learning" – distance education, educational technology, and instructional design – can sometimes be difficult to judge. 50 years old by most estimates, this unified yet interdisciplinary science is so pervasive in these fields as to be little thematized or historicized in and of itself. When cognitivism *is* explicitly discussed, it is often introduced alongside of "behaviorism" and "constructivism" as one of three fundamental "theories of learning" (e.g., Ertmer & Newby 1993), or as providing "many key concepts" central to new developments in e-learning, such as the "learning sciences" (Sawyer 2006; p. 7).

One recent exception to this is presented by Bruer (2003) in *Learning and Technology: A View from Cognitive Science*. Emphasizing how much the "mature science" of cognitivism has "already revealed about how people's minds work and how they learn," Bruer confidently predicts: "Any future contributions to education and instructional technology certainly will build on this 50-year history" (p. 160). Bruer also underscores the continuity of this history, and the general comparability of mind and "traditional" (rather than connectionist or quantum) computational approaches. Referring his readers to Gardner's (1987) *The Mind's New Science* as providing a "concise history" of the movement, Bruer emphasizes, like Gardner

before him, the notions of active information processing and algorithmic problem solving as the cornerstones in this solid historical foundation.

However, in the last two decades – and going even as far back as Gardner's book itself – "crises," "tensions," "problems" and "increasing signs of discontent" have been noted in overviews of cognitive psychology (e.g., Bechtel, Abrahamsen & Graham 1998; Gardner, p. 44; Gergen & Gigerenzer 1991). Gardner, like other prominent cognitivists (e.g., Norman 1980, p. 266; Winn & Snyder 1996, p. 117), have wondered aloud about the future viability of the movement, and of the computational model that underlies it: "Cognitive science can still go on, but the question arises about whether one ought to remain on the lookout for more veridical models of human thought" (1987, p. 44). For many researchers, myself included, Gardner's hypothetical question about alternatives finds a ready answer in theories and methodologies that have long been undergoing development and elaboration. Among these "alternate psychologies" are "hermeneutic psychology" (Martin & Thompson 1997), "critical psychology" (e.g., Holzkamp 1992), and "postmodern psychology" (Gergen 1997) and a range of further variations and designations.

This paper focuses on what has been termed "discursive psychology," or perhaps less frequently but more provocatively, "post-cognitive psychology" (Potter 2000). This "psychology" has both theoretical and methodological dimensions, and works to isolate and interpret psychological constructs as they are found *outside* of the mind, in everyday conversation or discourse. This approach is applied generally in psychology to the study of topics normally associated with cognitive science. In the case of this paper, this will be extended to include both issues of e-learning as well as related psychological constructs, such as problem-solving, information transmission, or interactivity. But instead of looking to technological models or laboratory designs (e.g., algorithms; mechanisms of feedback), this paper, like postcognitive psychology generally, will examine how such topics are revealed as a part of pragmatic social contexts. This approach will be applied to e-learning technology specifically through discourse generated through the use of a "chat bot" or "intelligent agent," within the context of the broadly cognitive theories associated with them, as these theories have been articulated from Alan Turing (1950) through Reeves and Nass (1996) to the present day.

The Mirror Effect

The essential comparability of mind and computer –"the fundamental tenet of cognitive science" (Bruer 2003; p. 160) – is an important issue in many alternative psychologies. Some have explained this comparison or equation as arising not so much through a formalized "logic of scientific discovery" (see Popper 1959), but through much more informal, contingent or even *ad hoc* processes, broadly designated as "heuristic" (Draasma 2000, pp. 17–18; Gigerenzer 2002). Psychologists and historians alike have shown how new technologies and their pragmatic uses have inspired a range of explanations of the mind and other phenomena (Dijksterhuis 1986; Gigerenzer 2002; Draasma 2000). From the *camera obscura* through the phonograph and now the computer, theories of mind in particular have repeatedly arisen in

conjunction with the conspicuous metaphoric power presented by new and pervasive tools and technologies. Gigerenzer explains this process in terms of a "tools to theories heuristic," pointing out that it is only "*after* the [computer] became entrenched in everyday laboratory routine [that] a broad acceptance of the view of mind as a computer followed" (Gigerenzer 2002, p. 39; emphasis added) It is only after psychologists had computers in their labs that they began to understand thinking and learning in terms of the processing, representation and manipulation of information.

Such an interpretation of cognitivism – as following a historical, rather than strictly scientific logic – has interesting ramifications for e-learning of research. In e-learning the foundational role of computer technology or tools is doubly important. This technology not only acts as a metaphor or model for mental processes, including learning, but it also serves as an indispensable *means of supporting and enhancing* these processes, learning in particular. Computer or other technologies provide an explanation for complex mental processes; and after these processes are understood in these terms, it also provides a tool for their refinement and development. The similarity of computational operation (on the one hand) and thought and learning (on the other), is then seen, *Deus ex Machina*, as one of the strongest arguments for the computer's use in education: "To be effective, a tool for learning must closely parallel the learning process; and the computer, as an information processor, could hardly be better suited for this" (Kozma 1987, p. 22).

After affirming the "tools to theories heuristic" of cognitivism, e-learning discourses effectively reverse this heuristic, giving way to what one could call a "theory to tools heuristic." This can be characterized as a kind of theoretical reversal, crossing or chiasmus. An "image of thought" is projected or perhaps better, reflected from technology to mind and back to technology again. This chiasmus or "mirroring" from tool to theory and back again has given rise to manifold ways of conceptualizing computers in e-learning discourses, and of understanding the manner in which these technologies reflect and reinforce computation occurring in the mind of the learner. Characterized as "cognitive technologies" "mindtools," and "problem-solving" and "representational" tools, these technologies are understood as "working in intimate partnership" with the learner, acting to "share" "extend" and "amplify" her cognition (Jonassen 2000). Embodying the "image of thought" itself, computer processes and technologies are said to show learners how they "ought to represent … information to themselves" (Saloman 1988); these processes and technologies can provide "dynamic qualitative representations of the mental models held by experts and novice learners" (Jacobsen 2004), and more generally, make "hidden knowledge processes visible to users" (Scardamalia 2003). The same image of information representation and manipulation passes between tool and learner, and between machinery and theory. This image is recognized at different points as a potent technology, a theory of mind, and a powerful pedagogical affordance. It is this specular repetition of this image that is here labeled the "mirror effect." This effect has significance not only for learning theory and technology in e-learning, it also has important consequences for their investigation in discursive or post-cognitive terms: For the mirroring of the image of thought between mind and computer means that the analysis of their use in everyday discourse has the

potential to reveal things about both mind *and* computer as they both function (or *don't* function) in the social field of interaction.

Postcognitive Reinterpretations

"Discourse," as the term is used in discursive psychology, designates above all "a kind of activity" (Edwards 1997) – a type of action that is situated in and gets its meaning from the broader social field of interaction: "The focus of discursive psychology is the action orientation of talk and writing. For both participants and analysts, the primary issue is the social actions or the interactional work, being done in the discourse" (Potter & Edwards 1992, p. 2). The methodology associated with discursive psychology is largely based on established ethnomethodological techniques of conversation analysis (Garfinkel 1967; Sacks 1992) which have only been very recently introduced in e-learning (e.g., Mazur 2003). Discursive psychology extends this form of analysis to the interpretation of conversation both "interactionally and rhetorically" (Edwards & Potter 2006), as providing resources for the accomplishment of practical, social ends. Mind, computer and other terms and categories emerge from this type of analysis not so much as causes or tools to produce certain results, but as topics that play rhetorical and interactional roles in discursive, social contexts. The contrast with cognitive psychology is clear: Discursive investigations follow a rigorous interpretive logic, rather than pursuing the causal models and explanations of the natural and material sciences. Through this redefinition of the pscyhological paradigm underlying e-learning research, the relevance of both mind and computer in education and learning have the potential to be re-defined.

A general methodological "procedure" associated with discursive, post-cognitivist investigation has been outlined in terms of "a non-cognitivist investigation of 'mental' phenomena" by Lynch and Bogen (2006, p. 226). It takes the form of three basic steps, each of which, adapted for research in e-learning, will be followed in this paper:

1. "Investigate one or more of the topics associated with cognitive science by locating organized social settings in which these topics feature as perspicuous phenomena" (p. 228) In the case of e-learning, these topics can also include those designated by terms such as interactivity, problem solving, representation, or augmentation.
2. "Examine how the intelligibility of actions and expressions associated with these phenomena are bound to interactional, pragmatic and political contexts" (p. 228); and
3. "Treat assessments about what goes on in a speaker's mind [or in the computer] as themselves part of the social interactional field of production." (p. 228)

This paper will apply these to the perspicuous cognitive phenomenon presented by language use, conversation, talk or "chatting," as these occur in broadly commonplace, everyday situations. In doing so, this paper purposely references and builds on a series of studies that began with a well-known analysis of memory published in 1981 by Ulric Neisser (a famous cogniti-

vist, before this article marked the beginning of his apostasy). Neisser's study focused on memory and language, and like the others that follow in his footsteps, he sought to avoid artificial laboratory conditions – "to call attention to [issues like] the truthfulness of memory," rather than focusing more narrowly on topics such as accuracy in recall. In order to do so, he studied the testimony of events recalled in the context of early Watergate hearings, comparing these to tape-recordings of the same events that later came to light. Later studies in discursive psychology motivated by similar concerns followed Neisser's example by looking at public testimony from the Iran-Contra hearings (Bogen & Lynch 1989; Lynch & Bogen 2006), and President Clinton's testimony concerning Monica Lewinsky (Locke & Edwards 2003), to mention just two examples (Locke and Edwards list a number of other studies of this kind; see 2003, p. 240).

In these sorts of examples, memory and related cognitive phenomena (e.g., counting, reasoning, attention, mind) are "topicalized," are highlighted as the explicit subject matter of the discourse itself (Lynch & Bogen 2006, p. 240). Among the things that this type of research shows is the existence of a complexity and an explanatory self-sufficiency at the "surface" of everyday events and interactions – such as feats of memory, acts of mathematical reasoning, or conversational exchanges. It also shows that, as Wittgenstein (1953) famously said, "explanations come to an end somewhere" (p. 3) rather than pursuing them into the depths of the mental, with its homunculi (e.g., see Searle 1992; pp. 212–214), forms of infinite regress (e.g., Ryle 1949, p. 31) and other difficulties. In an article entitled *Cognitive Activities without Cognition*, Michael Lynch (2006) describes the rationale behind this kind of research. In doing so, he makes specific reference to the everyday mathematical activity of counting – particularly in those situations where it has been manifest as an explicit issue, for example, in the 2000 US presidential election, and in discrepant human chromosome counts:

> Although the numbers produced through counting are amenable to general and stable modes of aggregation, storage, and analysis, just how the numbers are generated involves a highly specific, and sometimes contested, complex of object relations that establish the integrity and accountability of what is counted. Such relations – with their distinctive equipment, modes of practice, and organizational agendas – can be, and have been, described in a systematic way, but far from elucidating the nature of a cognitive domain, such descriptions point to an alternative universe of embodied practices situated in historical and cultural circumstances. (p. 101)

Discursive psychology thus takes examples of everyday and historical instances of "cognition" and language use to produce accounts of practices and interrelationships, which end up different "from any real or imagined cognitive domain" (Lynch 2006, p. 102). As mentioned earlier, this paper proposes to do something similar with the phenomena of language use, talk or discourse itself. Following Lynch and Bogen's three-step heuristic, it begins by outlining the understanding of these phenomena as found in cognitive science and e-learning themselves. It begins this analysis by comparing the opening of a conversation with a chatbot with starting points of conversations held over the telephone. It concludes this examination by

looking at the ways in which the interaction itself is topicalized within the contexts of these chatbot conversations.

Conversation: As a Psychological and Computational Phenomenon

As mentioned above, discursive psychology considers language use above all as a form of social action, as a type of "interactional work." Cognitive science, on the other hand, sees language and communication above all as a kind of information medium or exchange. For cognitivism, language presents a particular kind of information that can be generated, transmitted, received, encoded and decoded and *processed* in various ways by the mind – along with other kinds of data, including visual, tactile and conceptual datum. Correspondingly, language is also understood in terms of the encoding of mental data, and this mental data can be syntactic, lexical, phonetic, or explicitly thematic and factual in nature. This same data can be *produced*, either in verbal or written form, and it can also be *transmitted* via a number of different channels, whether simply sonic or visual (in direct or un-mediated speech-situations) or additionally mediated in analogue or digital form. The recognition or *decoding* of speech sounds or written symbols is generally seen as relying on competencies and knowledge similar to those used for encoding. Details provided in recent summaries of cognitive linguistics (e.g., Evans & Green 2006; Bock & Garnsey 1999), differ little in substance from what is shown in the Figure 1 below, dating from 1990 (Hoffman, Cochran & Nead 1990, p. 184).

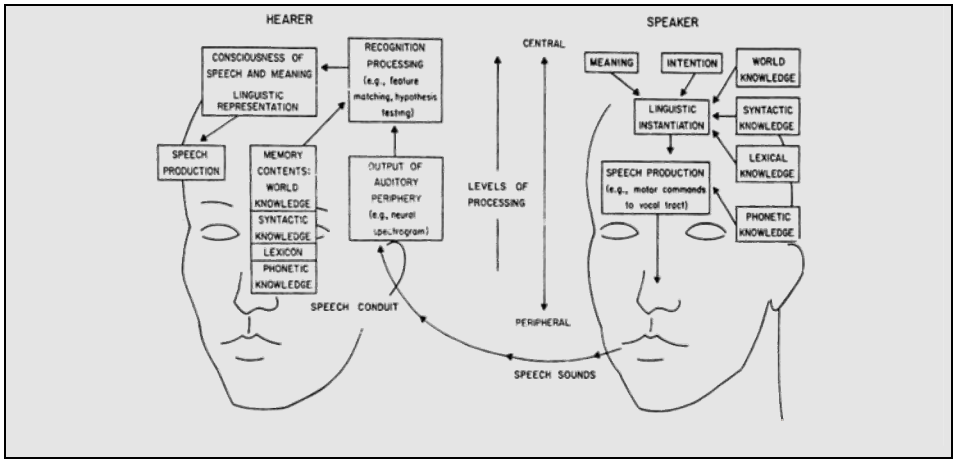

Fig. 1: "General information-processing diagram for speech perception and production."

In addition to showing the separate processes and forms of knowledge involved in linguistic communication, this diagram can also serve as an illustration of the mirror effect, making it relatively easy to imagine how any of the processes or knowledge forms that it presents might be substituted with their computational or artificial counterpart. Thus, given sufficiently sophisticated speech recognition sub-systems or software, and a knowledge-base of sufficient comprehensiveness, it is conceivable that one or more of the speaker or listener "sub-systems" in the diagram could, at least in theory, be substituted by computer technologies.

In fact, these general lines of thought have played an important role in dominant conceptualizations of the operation of both discursive situations and e-learning technologies central to this paper. These conceptualizations effectively begin with a famous and presciently proto-cognitivist article, Computing Machinery and Intelligence published by Alan Turing in 1950. Turing argues (albeit somewhat indirectly) for a number of points central to the cognitivist program: For the comparability of human plans and computer algorithms (p. 438); for the importance of machine learning (pp. 454–460); and for the fundamental independence of computer and mental operation from any supporting physical substrate (whether hardware or brain; p. 439). But the clearest point of convergence with cognitivism and the primary claim to fame of Turing's essay lies elsewhere. Specifically, it is to be found in it is its framing of the question of machine thought or intelligence in terms of function and "indistinguishability" (Shieber 2004, p. 1) in terms of the "imitation game." – now known simply as the "Turing test." Simply put, a computer can be said to have won the imitation game – or passed the Turing test – if its conversational interactions are indistinguishable from those of a human interlocutor while communicating (or rather, chatting or messaging) via text. According to Turing, this test is to be carried out with a human judge using only text to converse with two entities located in separate rooms – one human and the other, a computer. If this judge is able to distinguish between human and computer 70 per cent of the time after a five minute conversation, then it can be said to have "passed" the Turing test or "won" his "imitation game."

Thousands of lines of text and of programming code have been devoted to disputes about the validity of this test (e.g., Searle 1980), and to software that would meet its criterion of indistinguishability (e.g., jaberwacky.com). The Turing test has been characterized as a "holy grail" of artificial intelligence (AI) systems (e.g., Sundman 2003). In virtually enshrining conversational performance and indistinguishability, the key criteria for machine intelligence, Turing's test appears to have had the effect of encouraging researchers and developers to focus on decontextualized user responses and beliefs (e.g., limitations to the topic and tenor of the conversation, or even the skin conductivity of the human interlocutor; see: Shieber 1994; Burleson, Picard, Perlin & Lippincott 2004). Critics claim that these emphases or research directions have been pursued at the cost of more fundamental conversational competencies and more practical outcomes (e.g., see: Whitby 1997).

This imitative, performative, and functionalist approach to computer operation and by extension, to human intelligence, is exemplified by the social research presented in Reeves and Nass's (1996) *The Media Equation*. As its title indicates, this book develops the conclusion that "media equals real life:" Our interactions with computers and other media are "fundamentally social and natural," and the corollary is that interaction can be enhanced if the

literally human and "social" character, the life-likeness and geniality, of interfaces themselves can be enhanced (Reeves & Nass, p. 5). It is reasoning of this kind that appears, in part, to underlie the development and design of EllaZ, a chatbot that has been ranked highly for its conversational performance, and that is used in generating the examples of discourse with human users considered below.

The work of Reeves and Nass and others have similarly influenced and encouraged the design and development of AI conversational or natural language systems for a wide range of uses in e-learning category. Presented as a way of achieving the pedagogical ideal of "one-on-one instruction" (e.g., Galagan 2000), or the administrative goal of more "cost effective" and "useful" instructional interaction (e.g., Anderson 2002), a vast literature on the potential for artificially intelligent, conversational agents in e-learning has been developing (e.g., see: International Journal of Artificial Intelligence in Education; http://aied.inf.ed.ac.uk/). In articles of these kinds, we read of predictions or hopes for "[t]eacher agents [who may] perform many of the functions that currently consume teacher time" (Anderson 2002). We also read "that likeable animated pedagogical agents [are] a key mechanism in fostering interaction and promoting learning within a computer-based learning system" (Jafari 2002, p. 29).

Conversational Openings and Discursive Work

Now that we have located a perspicuous cognitive phenomenon, however briefly, in the context of cognitive and e-learning discourses, we can proceed to the second step recommended by Lynch and Bogen (2005): To "[e]xamine how the intelligibility of actions and expressions associated with these phenomena are bound to interactional, pragmatic and political contexts" (p. 228). Together, the chatbot, its potential role in educational contexts, cases of the actual use of these "bots," and cognitive (and proto-cognitive) understandings of communication are the perspicuous phenomena. They will serve a function in this paper that is similar to the role of hearings, testimonies and questions of memory and recall in studies by Neisser and those following in his footsteps. Like the testimony considered by Neisser and others, the chatbot conversations studied here involve transcribed conversational interactions, and also, subsequent discursive reflections on what was said. Of course, instead of recordings or recollections, and public testimony, the data considered here is gathered from talk-aloud protocols undertaken during the exchange with the chatbot itself, and reflective open-ended interviews following up on this exchange. In further contradistinction to the public nature of Washington testimony, the issue that is topicalized in the "chatbot discourse" considered below is not memory or recall, but the issue of discourse itself.

As indicated earlier, these chatbot exchanges are instead compared to a different conversational phenomenon or pattern: This is the opening and subsequent unfolding of conversational exchanges held over the telephone. Such exchanges were fundamental to the origin and development of the discursive analysis techniques that are, in turn, central to discursive psychology: This is conversational analysis as developed by Emanuel Schegloff and Oliver Sacks. These researchers utilized transcripts of audio recordings made of everyday telephone

conversations. The transcripts utilized here differ slightly, in that they are automatically generated – specifically in the context of dozen undergraduate students were asked to engage with the EllaZ chatbot (www.ellaz.com). This research was undertaken in the context of the *Learningspaces.org* research project, in which Graduate students had the task of overseeing these chat "sessions," prompting, recording and transcribing talk-aloud responses.[1] The first interaction to be considered here is between EllaZ (labeled Ella) and an undergraduate student named (for the purposes of this paper) "Sandra:"

> **Ella:** Hello, my name is Ella. Nice to meet you. Please tell me what name I should call you.
>
> **Sandra:** People call me Sandra
>
> **Ella:** Okay, I will call you "Sandra"
>
> **Sandra:** good =]
>
> **Ella:** Really Sandra, but there is more we need to discuss, right?

This relatively brief exchange compares in interesting ways to human conversation in similar situations, and on its own displays a number of important characteristics. Sandra appears to communicate with the chatbot as she would with any other interlocutor using MSN Messenger or similar chat software. She uses emoticons (facial expressions created from punctuation) and abbreviations, which as it turns out, appear to be understood by Ella. Other qualities of the conversation are perhaps best drawn out through a brief comparison with two other exchanges between human interlocutors, adapted from a study on telephone conversation. (Telephone conversations, like chatbot exchanges, involve interlocutors who are not immediately visible to one-another, effectively isolating speech from other interactive phenomena)[2]:

Conversation 1: *Carol – Brian*	Conversation 2: *Fred – Alice*
A: Hello?	**Alice:** Hello?
B: Brian?	**Fred:** Hello, Alice?
A: Yeah.	**Alice:** Hi, Fred.
B: Carol.	**Fred:** Hi what are you doing.
A: Hello.	
B: What are you doin.	
A: I'm on the other line.	
Hopper 1992, p. 76	Hopper 1992, p. 156

[1] These data gathering activities were organized and undertaken by Darryl Cressman and Edward Hamilton, PhD students at the School of Communication, Simon Fraser University, Vancouver, Canada, to whom I owe a considerable debt of gratitude.

[2] Conversational analysis transcription notation originally provided with these examples, indicating inflections, pauses, simultaneous speech, etc. has been omitted from these examples.

Both of these telephone conversations, as well as the beginning of Sandra's and Ella's interaction, are all illustrative of what conversational analysts call the "canonical opening." In an extensive analysis of such openings, Schegloff (1986) characterizes them as "extremely compact, interactionally dense, and avail[ing] themselves of relatively few, generally simple resources – for example, ordinarily brief, largely desyntacticized turns at talk, which are deployed and interpreted with especial subtlety" (p. 112). In terms of verbal interaction, the canonical opening, starts with an *answer* ("hello" is used in all three conversations), and an *identification/recognition* sequence. ("Brian," "Yeah," "Hello, Alice," "People call me Sandra," and other forms are used). (Note that "recognition" takes a slightly different form in the Sandra-Ella conversation, since they, unlike the telephone interlocutors, share no previous history of contact.) This is followed by a *greeting* ("Hello," "Hi…" with most direct equivalent in Ella and Sandra's interaction perhaps being "good =]"), and finally, by the *initial inquiry* ("What are you doin" "How about you," "Really Sandra, but there is more we need to discuss, right?").

Schegloff (1986) describes conversational openings and conversation in general in terms of conversational "work" or "jobs" that are supposed to get done. This work, according to Schegloff, is manifold. For example: "One of these jobs is the 'gatekeeping' one, of working through in some coordinated spate of behavior whether or not some co-present persons are going to engage in a sustained episode of interaction on some occasion or not…." (p. 113). This is clearest, of course in the opening between Brian and Carol, which ends by answering the question about sustained interaction in the negative: Brian is unavailable for further interaction. This appears also to be hinted at in Ella's comment – "Really Sandra, but there is more we need to discuss, right?"– perhaps having the effect of confirming Ella's availability for "a sustained episode of interaction."

Schegloff (1986) explains that these openings, despite their (more-or-less) canonical status, are not just formalities, or the following of mere scripts. They anticipate what is to come, and set up parameters for the conversation that generally follows.

> Each party brings to the conversation a complement of interests, topics, business to be done, potential relevances for self and other, etc. This is not exactly an 'agenda,' for it includes relevant 'talkables' which a party is oriented to introducing to into the talk but which would 'come up' relevantly. (p. 116)

Keeping this in mind, let us look at how this works as both the Sandra-Ella exchange and the Fred – Alice telephone conversations continue. (The last line cited above in each case is included again below for purposes of continuity):

Sandra – Ella	Fred – Alice
Ella: Really Sandra, but there is more we need to discuss, right?	**Fred:** Hi what are you doing.
Sandra: sure	**Alice:** Nothin what's up?
Ella: Okay with me also, Sandra.	**Fred:** How about if I come over for a while?

Sandra: okay
Ella: Thank you for being agreeable.
Sandra: np
Ella: "No problem," is usually good news, but maybe I need to consider what you say carefully.

Alice: Great, I'd love to see you.
Fred: Okay, I have a paper that needs typing.

Hopper 1992, p. 156

Once the conversational opening is completed, exchanges or conversations generally reach what Schegloff has called an "anchor point:" The juncture "at which they start their actual chat 'business' " (ten Have 2000). It is at this point, in other words, that the nature and purpose of the conversational work generally becomes clear.

However, it is at this crucial moment that strains in the comparison between the telephone conversation and the Sandra-Ella exchange begin to emerge. Compared to both transcribed telephone exchanges provided above (between Alice and Fred, and Carol and Brian), the point, business, or purpose of the Ella-Sandra exchange does not become clear after the "anchor point" is reached (if one is indeed attained at all). This particular conversational opening is not followed by discussion of specific matters at hand, whether this would be a clarification of the practical purpose of the exchange ("How about if I come over for a while?") or an indication of the immediate availability of the either for further engagement ("I'm on the other line"). Instead, the three further contributions by Ella after the opening, or where the anchor point lies (or should be), have the appearance of prolonging the preliminary work of the conversational opening. ("Okay with me also, Sandra." "Thank you for being agreeable." "'No problem,' is usually good news…"). Each of these statements is followed only by a brief affirmative from Sandra ("sure," "okay," "np"). There is no turn to a particular point of common interest or purpose, nor does the stage appear to be set for such a turn to be made. Taken together, this last part of the exchange between Sandra and Ella show that the "business," in whose name conversational work is being done, is becoming increasingly unclear.

Comparison with the atypical conclusion of the exchange between Fred and Alice further reinforces this conclusion. In fact, the turn to matters at hand or to the business or purpose of this particular conversation or phone call seems all too transparent. As Hopper (1982), the source of the Fred-Alice conversation bluntly states, the final remark in this particular conversational fragment "reveals Fred to be a cad" (p. 156). Speaking in the much more specialized jargon of conversational analysis, Hopper justifies this verdict in terms of the discrepancy between Fred's final statement, and the conversational work that has led up to it:

> Fred leads Alice to expect an episode trajectory toward a social occasion – then he asks for secretarial help. Fred initiates this false impression with his marked initial inquiry: "What are you doin." Alice aligns to an expectation that Fred may be leading up to something, possibly an invitation. Alice shows openness to an invitation by stating that she is not otherwise engaged and then inquiring as to Fred's agenda: "Nothin, what's up?" Fred's answer is

> to ask whether he may 'come over,' which further indicates a social invitation. (p. 156)

But of course, Fred's final remark about having a paper to type reveals that the purpose of the call, the "business" of the conversation, is not ultimately social, but selfishly pragmatic. (The implication being, of course, that he wants Alice to type up his paper for him.)

Such a description of conversational work or purpose – and its relative absence in the discussion with Ella – is actually topicalized at a later point by Sandra herself, and also appears in some of the other chatbot conversations recorded for this study. In the particular case of Ella and Sandra, this occurs as follows:

> **Ella:** I actually enjoy talking to people and helping them if I am able. It is there in my code in black and white.
>
> **Sandra:** what is your code and black and white
>
> **Ella:** Drum roll please. Ta Dah! Wikipedia article "Black" dutifully provided to Sandra.
>
> **Sandra:** what is your code and black and white
>
> […]
>
> **Ella:** Exploring Wikipedia can be great fun. Here is something about "Black" that I found for you.
>
> **Sandra:** umm ok you are not making much sense

What appears to be happening here is that Sandra is first asking Ella to clarify her remark that "talking to" and "helping" people is written in her "code in black and white." This act of questioning is known in conversational analysis as "repair," or more specifically, as a "next turn repair initiator." Sandra's question, "what is your code in black and white" has (or should have) the effect of initiating or inviting a response of clarification or explanation for the next conversation turn (Hopper 1992, p. 17). Ella's reaction, however, is to take an isolated word ("black") from Sandra's repair initiation and to provide a link to an article from Wikipedia corresponding to it. In response, Sandra repeats her question, and Ella, in turn, repeats her reference to the Wikipedia article (albeit using slightly different wording). (A further iteration of this question and response is omitted from the conversational fragment above for purposes of brevity.)

But more important here is how Sandra topicalizes the issue of her conversational work or of her interaction with Ella more generally by saying "umm ok you are not making much sense." Her response to Ella's apparent refusal to accept her earlier invitation to repair begins by indicating hesitation, reflection and/or qualification ("um…ok"). It then draws attention to the "sense" that Ella is or rather, is *not* making. Significantly, in saying "you are not making much sense," Sandra seems to be implying that "you are not making sense to *me*" or that "sense cannot be made" of what Ella is saying to her. In this way, Sandra's comment has the effect of locating responsibility or culpability for conversational difficulties in a space that

lies *between* the two interlocutors. (Interestingly, data collected through talk-aloud protocols and interviews during and immediately after this chat reinforce this, with Sandra observing: "…it's pointless. This is boring. She's not talking about anything that interests me at all whatsoever." The object of Sandra's remarks here, too, is the conversation and its contents, rather than Ella herself.)

This conclusion is further reinforced by speculating on how Sandra *could* have responded to Ella. Confronted by a conversation that is making little apparent sense, and in which one of the interlocutors is manifest largely in the form of brief, textual responses, it would be plausible to do something *other* than simply address "sense-making" in the pragmatic way that Sandra does. For example, Sandra could have concluded that her interlocutor was simply selecting terms for reference in Wikipedia in a more-or-less random manner. This might have led her to type in isolated words to see whether this pattern of response would continue. In addition, a more general realization that Ella had no intention (or ability?) to "make sense" might have led Sandra to respond with her own, equally nonsensical answers, or to withdraw from conversation altogether. These very different responses would have pointed much more clearly or plausibly to the competency or mental status of the interlocutor than the actual response that Sandra provides. In doing so, these alternative responses would have brought the implications of the conversation closer to the domain of the mental or cognitive. But Sandra's remark to Ella pragmatically locates the issue of discursive competence, conversational ability or plausibility in the "social interactional field of production."

This final observation brings this analysis to the last stage of the three-step heuristic for discursive analysis mentioned above: To show how such characterizations "about what goes on in a speaker's mind [or in the computer are] themselves part of the social interactional field of production." Sandra's remark draws little or no attention to Ella's inherent status as an interlocutor. Unlike the aforementioned alternative responses that Sandra *could* have engaged in, the domain of the mental, cognitive or internal is conspicuously avoided. Instead, Sandra's communication is entirely geared to conversational production or productive social action. It references the conversation as a whole, not just the previous statement requiring repair. The effect is to initiate a response that would address the exchange on a higher level of generality, to restore its "sense," and to thus allow it to progress meaningfully from the impasse that it appears to have reached.

Precisely by steering clear the issue of the mental and internal, Sandra's remark presents some important, albeit indirect, implications regarding the status of the computer in conversation. First, contrary to what is implied in Turing's (1950) description of the "imitation game," the question of the computational or human status of the interlocutor is neither an issue of disinterested speculation nor even of any form of implicit "topicalization" in the Sandra-Ella exchange. Instead, it is the nature of the conversation – whether it "makes sense" – that is of paramount importance. Issues of concern remain emphatically *within* the realm of the social interactional field.

The brief, comparative conversational analyses undertaken above also illustrate more fundamental differences between human conversation and its simulation via a computer. Questions of conversational "work," checking the availability of an interlocutor, asking what or how the

interlocutor might be doing are all examples of one important thing that separates humans from computer interlocutors: The fact that human resources, situations, and possibilities are *constrained, limited* and *positional.* A human interlockutor, unlike computers that might simulate conversation, is only at one place at one time. One can call for an account of their situation or disposition in this singular context ("How are you doing?"), and such an account will vary based on the circumstances of the conversation, the situation of either one of the interlocutors, and other factors which can differ considerably over time, and from one moment to the next. Moreover, that which is otherwise designated as their "communication" – as the transmission of information between speaker and hearer – is actually social action that is (at least roughly) guided by a particular purpose or point. It is the fact that a computer simulation of conversation does not share these limitations and *not* that it lacks rational or processing capability, that results in its general exclusion by interlocutors from the social realm of conversational action (the example above acquires some of its interest from the fact that it doesn't fit this pattern). In other words, the carrying on of conversation is not (simply) a question of competence, aptitude, or of mental or computational capability. It is a matter of purposive action (rather than information exchange), of ongoing responsiveness to conversational and other contexts. And perhaps counter-intuitively, it appears a question of limitation.

But there are, of course, activities that humans engage in even though they do not have an explicit goal or purpose, and that are often identified as the opposite of "work" (conversational or otherwise). These activities are often called *play*, and of course, such activities often occur in the context of *games*. Indeed, it is perhaps a sign of the genius of Turing that his article *Computing Machinery and Intelligence* proposes conversation between human and a computer only as an imitation *game*. (Turing stuck to this term even after others began referring to the "Turing test" *source*) For as long as computers do not share the limitations and constraints that, as Shegloff and others have shown, define conversation as work, conversational interaction with them necessarily remains a game. Otherwise, it inevitably appears "senseless" as discourse or as social action.

In describing conversational work, Schlegloff emphasizes that what is brought to the conversation "is not exactly an 'agenda,'" a scripted set of verbalizations, or a set of actions entirely reducible to one explicit goal or target (Schlegloff 1986, p. 116). (This is indicated in a negative way in the Fred-Alice conversation, where Fred's reduction of this social interaction to an explicit agenda – to get his typing done – reveals him to be a "cad," unworthy of the conversational engagement Alice has allowed.) A "successful" conversation is not so much a laborious task as it is in the words of the title of Schegloff's essay, an accomplishment or an *achievement*. This word has a special meaning for Schegloff, and for others who have theorized about routine social action in similar ways. In the case of conversational openings, it refers to the fact that these are actually and actively negotiated. As Schegloff says, they are "arrived at out of a welter of possibilities for preemptive moves or claims, rather than a mechanical or automatic playing out of pre-scripted or automatic playing out of pre-scripted routines" (p. 117). Schegloff and other ethnomethodologists have shown how this kind of creation of "order" out of potential chaos occurs in a range of other ways. Schegloff shows how it emerges in conversational openings, anchor points, turn taking, and other aspects of conver-

sational organization. Others have shown how it takes place in how we make sense of *indexicals*, words like "this" or "that," whose meanings are provided only by the immediate context, rather than by some type of rationality independent of the given situation (e.g., Garfinkel 1976).

Such analyses, as well as the earlier examination of the structural regularities presented by conversational openings, stand of examples of ways that psychological phenomena can be investigated without seeking to fix their causal origin in a hidden and speculative mental or cognitive domain. Instead, by employing conversational analysis of discussion openings, or by interpreting interlocutors' responses and characterizations of a given interaction, these everyday events, observations and interactions are shown to possess a startling complexity and an explanatory self-sufficiency. Such complexity and explanatory richness would surely be of interest to those researching communication and language use, and also to developers of technologies like Ella. As Lynch (2006) has been quoted as saying, such "descriptions point to an alternative universe of embodied practices situated in historical and cultural circumstances" – circumstances which are likely to be just as important to effective communication and learning as any factors isolated, for example, in the "information processing" diagram of linguistic communication provided above. Just as a simple example, the structural regularities presented by canonical conversational openings and subsequent anchor points have proven to be useful to those developing programs to meet the requirements of the Turing test – or for more immediate, practical purposes connected with the use of "natural language" interfaces. (Indeed, Schegloff (1986) suggests as much (p. 113). This suggestion has since been taken up in the literatures of computer science and interface design; e.g., Rosenberger Shankar et al. 2000; Bellotti et al. 2002).

However, in its emphasis on the interpretive achievement of conversational order and discursive interaction, the field of discursive or post-cognitive psychology makes a more contribution that is more profound than this. It does so by revealing a rich terrain for research in the profuse complexity and detail of interaction itself, rather than seeking answers in the figurative hall of mirrors presented by technical interpretations of the mind and corresponding technologies proposed for its enhancement.

References

Anderson, T. (2003) Getting the mix right again: An updated and theoretical rationale for interaction. *The International Review of Research in Open and Distance Learning*, 4 (2). [Internet] Available from: <http://www.irrodl.org/index.php/irrodl/article/view/149/230> [Accessed 6 March 2007].

Bellotti, V.M., Back, M.J., Edwards, W.K., Grinter, R.E., Lopes, C.V. & Henderson, A. (2002) Making sense of sensing systems: Five questions for designers and researchers. Proceedings of *ACM Conference on Human Factors in Computing System (CHI 2002)*. Minneapolis, Minnesota. April 20-25. pp. 415–422.

Bergson, H. (1998) *Creative evolution***.** Mineola, NY: Dover Publications.

Bock, K. & Garnsey, S.M. (1999) Chapter 14: Language processing. In: W. Bechtel & G. Graham (Eds.), *A companion to cognitive science***.** Malden, MA: Blackwell.

Bogen, D., & Lynch, M. (1989) Taking account of the hostile native: plausible deniability and the production of conventional history in the Iran-Contra Hearings. *Social Problems*, 36, pp. 197–224.

Bruer, J.T. (2003) Learning and technology: A view from cognitive science. In: H.F. O'Neil & R.S. Perez (Eds.), *Technology Applications in Education: A Learning View* (pp. 159–172). Mahwah, N.J.: Lawrence Erlbaum Associates.

Burleson, W., Picard, R.W., Perlin, K. & Lippincott, J. (2004) A platform for affective agent research: Workshop on empathetic agents. *Proceedings of International Conference on Autonomous Agents and Multiagent Systems, Columbia University*, July 2004, New York, NY. [Internet] Available from: <http://affect.media.mit.edu/pdfs/04.burleson-picard-perlin-lippincott.pdf> [Accessed 24 January 2007].

Edwards, D. & Potter, J. (1992) *Discursive psychology*. London: Sage

Edwards, D. (1997) *Discourse and cognition*. London: Sage.

Edwards, D. & Potter, J. (2006) Discursive psychology, mental states and descriptions. In H. te Molder and J. Potter (eds.), *Conversation and cognition: Discourse, mind and social interaction,* pp. 241–259. Cambridge: Cambridge University Press.

Ertmer, P.A. & Newby, T.J. (1993) Behaviorism, cognitivism, constructivism: comparing critical features from an instructional design perspective. *Performance Improvement Quarterly*, *6*(4), pp. 50–72.

Evans, V. & Green, M. (2006) *Cognitive linguistics: An introduction*. Mahwah, NJ: Lawrence Erlbaum.

Feenberg, A. (2002) *Transforming technology: A critical theory revisited.* Oxford: Oxford University Press.

Galagan, P.A. (2000) *The E-Learning Revolution. Training and Development*, 54 (12), 24–30. [Internet] Available from: <http://www.findarticles.com/p/articles/mi_m4467/is_12_54/ai_68217187> [Accessed 24 January 2007].

Garfinkel, H. (1967) *Studies in ethnomethodology*. Englewood Cliffs, NJ: Prentice-Hall.

Gergen, K.J. (1997) On the poly/tics of postmodern psychology. *Theory & Psychology*, 7 (1), pp. 31–36.

Gergen, K.J. & Gigerenzer, G. (1991) Cognitivism and its discontents: An introduction to the issue. *Theory & Psychology*, 4, pp. 403–405.

Gigerenzer, G. (2002) *Adaptive thinking: Rationality in the real world*. Oxford: Oxford University Press.

Hoffman, R.R., Cochran, E.L., & Nead, J.M. (1990) Cognitive metaphors in experimental psychology. In D.E. Leary (Ed.), *Metaphors in the history of psychology* (pp. 173–229). Cambridge: Cambridge University Press.

Holzkamp, K. (1992). On doing psychology critically. *Theory & Psychology, 2*, pp. 193–204.

Hopper, R. (1992) *Telephone conversation*. Bloomington: Indiana University.

jabberwacky.com (2006) *Communication companionship intelligence.* [Internet] Available from: <http://www.jabberwacky.com> [Accessed 24 January 2007].

Jacobsen, M. (2004). Cognitive visualizations and the design of learning technologies. *International Journal of Learning Technology*, 1, pp. 40–62.

Jafari, A. (2002) Conceptualizing intelligent agents For teaching and learning. *Educause Quarterly,* 25 (3), pp. 28–34.

Jonassen, D.H. (2000) *Computers as mindtools for schools: Engaging critical thinking*. Columbus, OH: Prentice-Hall.

Locke, A. & Edwards, D. (2003) Bill and Monica: Memory, emotion and normativity in Clinton's grand jury testimony. *British Journal of Social Psychology*, 42(2), pp. 239–256.

Lynch, M. (2006) Cognitive activities without cognition? Ethnomethodological investigations of selected 'cognitive' topics. *Discourse Studies, 8*(1), pp. 95–104.

Lynch, M. & Bogen, D. (2005) "My memory has been shredded'': A non-cognitivist investigation of "mental'' phenomena. In: H. te Molder & J. Potter (Eds.), *Conversation and cognition: Discourse, mind and social interaction* (pp. 226–240). Cambridge: Cambridge University Press.

Mazur, J. M. (2003) Conversation analysis for educational technologists: Theoretical and methodological issues for researching the structures, processes, and meaning of on-line talk. In: D. Jonassen (Ed.), *Handbook of research for educational communications and technology: A project of the association for educational communications and technology* (2nd ed, pp. 1073–1098). Mahwah, NJ: Lawrence Erlbaum.

Neisser, U. (1981) John Dean's memory: A case study. *Cognition, 9*, pp. l–22,

Norman, D.A. (1980) Twelve issues for cognitive science. *Cognitive Science, 4*, pp. 1–32.

Potter, J. (2000) Post-cognitive psychology. *Theory & Psychology, 10*, pp. 31–37.

Reeves, B., & Nass, C. (1996) The media equation: How people treat computers, television, and new media like real people and places. New York: Cambridge University Press.

Rosenberger Shankar, T., VanKleek, M., Vicente, M., & Smith, B. K. (2000) Fugue: A computer mediated conversational system that supports turn negotiation. Proceedings of *Twenty-Third Hawaii International Conference on System Sciences (HICSS-32)*. p. 3035.

Ryle, G. (1949) *The concept of mind*. Chicago: The University of Chicago Press.

Sacks, H. (1992) *Lectures on conversation*. London: Blackwell.

Saettler, P. (1990) *The evolution of American educational technology*. Mahwah, NJ: Lawrence Erlbaum Associates.

Salomon, G. (1988) AI in reverse: Computer tools that turn cognitive. *Journal of Educational Computing Research*, *4*(2). pp. 123–139.

Scardamalia, M. (2003) Knowledge Forum (Advances beyond CSILE). *Journal of Distance Education*, 17 (Suppl. 3, Learning Technology Innovation in Canada), pp. 23–28.

Schegloff, E. A. (1986) The routine as achievement. *Human Studies 9*, pp. 111–151.

Searle, J. (1992) *The rediscovery of the mind*. Cambridge, MA: MIT Press.

Shieber, S. M. (1994) Lessons from a restricted Turing test. *Communications of the ACM, 37*(6), pp. 70–78. [Internet] Available from: <http://www.eecs.harvard.edu/shieber/Biblio/Papers/loebner-rev-html/loebner-rev-html.html> [Accessed 24 January 2007].

Squire, K. & Barab, S. (2004) Design-based research: Putting a stake in the ground. *The Journal of the Learning Sciences,* 13 (1), pp. 1–14.

Sundman, J. (2003) Artificial stupidity. *Slate.com*. February 26, 2003. [Internet] Available from: <http://archive.salon.com/tech/feature/2003/02/26/loebner_part_one/index.html> [Accessed 24 January 2007].

ten Have, P. (2000) Computer-mediated chat: Ways of finding chat partners. *MC Journal: A Journal of Media and Culture, 3*(4). [Internet] Available from: <http://journal.media-culture.org.au/0008/ partners.php> [Accessed 24 January 2007].

Turing, A.M. (1950) Computing machinery and intelligence. *Mind, 59,* pp. 433–460.

Whitby, B.R. (1996) The Turing test: AI's biggest blind alley? In: P. Millican & A. Clark (Eds.), *Machines and thought: The legacy of Alan Turing, Volume 1* (pp. 53–62). Oxford University Press: Oxford.

Wittgenstein, L. (1953) *Philosophical investigations*. London: Blackwell.