

An Inquiry into Inferring

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The following inquiry will investigate the various taxonomies of inferring. The purpose of investigating other taxonomies is to provide a synthesized structure that both deepens understanding of the full scope and range of inferring, and allows one to logically and efficiently categorize inferences without the need to reference external sources.

Prior to this specific investigation the author used the following definitions for the various elements of inferring.

Inferring

Inferring: Inferring occurs when the reader expands upon or extends what is actually written in the text. The mental images and understandings that are derived from the text but not explicitly stated by the text are inferences.

Classes of Inferences *Logical*

Inference: Those inferences that are based upon a process of logic, typically regarding events and occurrences in the text. The distinction between logical and emotional inferences is not one without numerous murky overlaps. The distinction is made to aid in monitoring balance in both the types of inferences the students make and the teacher prompts for.

Emotional Inference: Those inferences that are based upon emotional content, typically regarding character's feelings. The distinction between logical and emotional inferences is not one without numerous murky overlaps. The distinction is made primarily to aid in monitoring balance in both the types of inferences the students make and those that the teacher prompts for.

Types of Inferences *Cohesive Inference*: Cohesive inferences are those inferences that a reader needs to make in order to understand the text. Authors make assumptions that their intended audience has the necessary prior knowledge needed to fill in the missing information. For example, to be able to fully understand the following, *She saw smoke pouring out of the neighbor's house, and immediately dialed 911*. You must make two coherence inferences. 1) The smoke pouring out of the house is not a good thing. It likely means there is a fire. 2) You call 911 when there is an emergency to get help (Pottle, 2012). The author makes the reasonable assumption that the intended audience will have the necessary prior knowledge to make these inferences to maintain coherence.

Elaborative Inference: While elaborative inferences aid in, and deepen comprehending, they are not required for comprehending. For example, when reading the following: *She saw smoke pouring out of the neighbor's house, and immediately dialed 911*. You may infer that she called on a cell phone. This inference would be elaborative (Pottle, 2012). This inference is not required

to comprehend the sentence, but it does expand a reader's comprehension by providing a more detailed mental image.

Predictive Inference: A predictive inference is more commonly referred to as a prediction. A prediction is a type of inference because it is the reader combining what the author explicitly states with his or her prior experience to generate thinking about the text that was not explicitly stated by the author. In the case of a predictive inference, this reader generated extension projects forward into the structure of the text to points that have not yet been read.

Inferring is often cited by the literature as an important strategy for comprehending. This importance is demonstrated by the descriptive words that were used to describe inferring's role in comprehension such as, *central*, *crucial* (Chikalnga, 1992), *requires* (Barnes, Dennis, & Haefele-Kalvatis, 1996), and *critical* (Casteel, 1993). Could inferring be called the pinnacle strategy of comprehending?

Ozgungor and Guthrie (2004), approached the notion of inferring's pinnacle

status by claiming that a difference between students with strong comprehension and those without, is the ability to infer. They claimed that good readers produce inferences to repair meaning, while poor readers tend to simply paraphrase.

While all of the literature reviewed spoke of the importance of inferring's role in comprehension, none went so far as to directly claim that it is the pinnacle cognitive activity of comprehending. However, the ease with which other comprehension activities can be shown to feed directly into inferring, prohibits the claim from being dismissed.

With this in mind, attention will now focus upon the design of a useful taxonomy of inferring.

Review of Taxonomies of Inferring

Perhaps ironically one can, at best only infer inferring's role as the pinnacle strategy of comprehension. When contemplating a possible taxonomy for inferring however, the literature is more explicit. Still, a little synthesis of the literature may produce some more useful structures.

Logical and Emotional Inferences

We will begin by reviewing what support currently exists in the literature for the taxonomy suggested above and what changes might be suggested by this literature. There is some support for dividing types of inferences into the categories of logical and emotional. Chikalanga (1992) claimed that some inferences are logically derived while others are based in emotional content.

Additionally, Graesser, Singer, and Trabasso (1994) defined thirteen classes of inferences. Two classes are inferences specifically based upon emotion content and two are inferences specifically highlighting logical processes. Additional attention will be directed toward these thirteen classes of inferences shortly. For now, it simply provides support for dividing inferences into the categories of logical and emotional.

Cohesive, Elaborative, and Predictive Inferences

The second set of categories that need to find support in the literature are those of cohesive, elaborative, and predictive. Cohesive inferences are defined in multiple texts as those inferences that must be made in

order to comprehend (Barnes, Dennis, & Haefele-Kalvatis, 1996; Bowyer-Crane, & Snowling, 2005; Smith, & Hancox, 2001).

Elaborative inferences are also discussed in multiple texts. These texts support the definition of elaborative inferences as being inferences that are made but are not required for comprehension or cohesion (Barnes, Dennis, & Haefele-Kalvatis, 1996; Bowyer-Crane, & Snowling, 2005). Chikalanga (1992) noted that these inferences have also been referred to as *invited* inferences. Meaning that the author has invited the reader to make these inferences, but does not require the reader to make them.

Some of the literature did not explicitly place predicting as a type of inference, but instead placed it as its own strategy for comprehending (Fountas, & Pinnell, 2006; Dorn, & Soffos, 2005). Others categorized predicting as a specific type of inference (Allbritton, 2004; Casteel, 1993; Smith, & Hancox, 2001; Graesser, Singer, & Trabasso, 1994).

Forward and Backward Inferences

Smith and Hancox (2001) provided both a definition of predictive inferences and suggest an addition structure for a taxonomy of inferring: “These inference types can be further subdivided, into those which occur in a backwards direction relative to the progression of narrative time (connecting, explanatory inferences), and those which occur in a forwards direction (predictive inferences)” (p. 311).

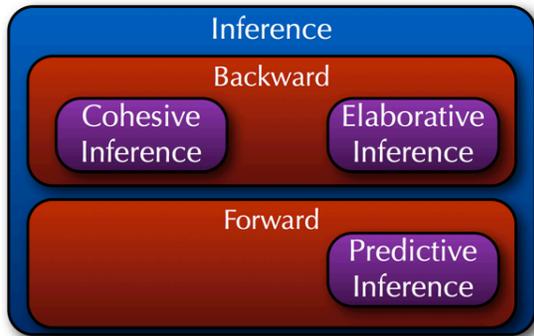
Building a Taxonomy

After a review of some earlier taxonomies of inferring, some overlaps and intersections can be seen. These can be used to help develop a more complete and usable taxonomy of inferring.

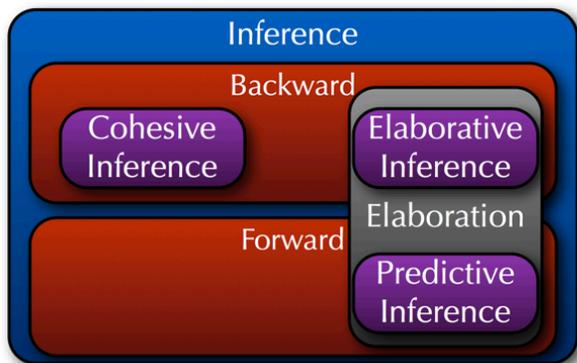
Cohesive, Elaborative, and Predictive Inferences in a Directional Framework

This categorization of inferences into forward and backward provides a more useful primary subdivision of inferring than emotional and logical. This is because predictive, elaborative, and cohesive inferences can be divided into the categories of forward and backward without overlap. This would cause the visual representation of

the inference taxonomy to be changed as follows:



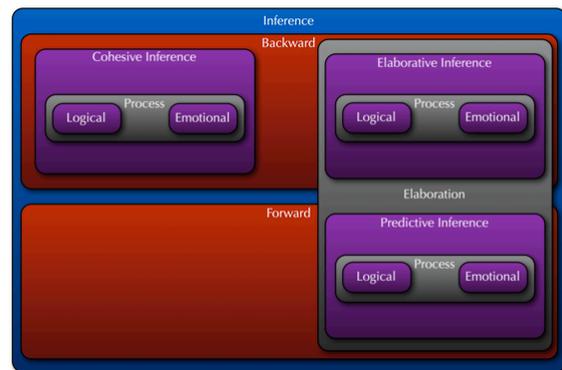
Additionally, it may be useful to represent a link between elaborative inferences and predictive inferences. Both are a type of elaboration, meaning that neither is required for comprehension. In fact, Smith and Hancox (2001) found evidence that most predictive inferences a reader makes are rapidly discarded if information is not found in the text to support the prediction.



Now the visual representation is amended to show that both elaborative and predictive inferences are types of elaborations a reader makes.

The Logic/Emotion Dichotomy

While the categories of emotional and logical may not be appropriate as a primary division of inferring, the number of sources that cite this division (Graesser, Singer, & Trabasso 1994; Bowyer-Crane, & Snowling, 2005; Smith, & Hancox, 2001), suggests it is a useful one. Through numerous observations of various classroom instruction, it appears that teachers tend to instructionally favor one and emphasize the other less. If nothing else, this division will provide a useful context for teachers to monitor their inferring instruction for appropriate balance.

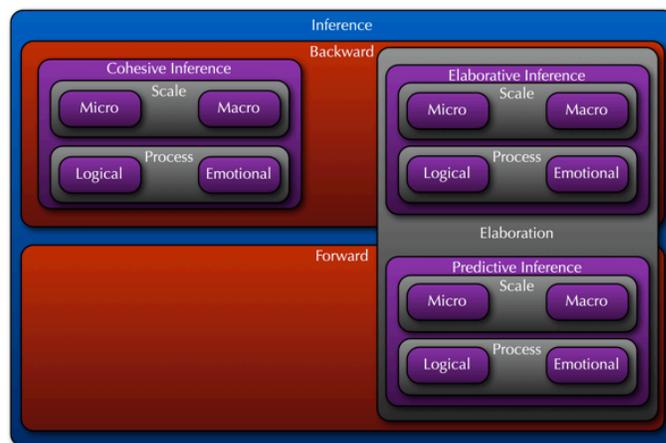


The Micro/Macro Dichotomy

A second either-or categorization that is useful to make is the scale of the inference. Bowyer-Crane and Snowling (2005) looked at comprehension and inferring through a structure they attributed to Walter Kintsch. This involves processing at the word, sentence, and text or passage levels. Kintsch (1998) also referred to these various levels of processing to be occurring at the *micro* and *macro* levels. In the context of inferring, the term micro-level will be used to refer to the inferring that takes place between the word and sentence level.

For example, in the sentences: *Bob went to the store. He bought an ice cream.* a low-order, micro-level inference would be linking *He* to *Bob*. These are the types of inferences that take place at what is sometimes referred to as the making and repairing meaning level of comprehension.

An example of an inference made at the macro-level would be inferring what the theme of the text was. In most writing, the theme of the piece is to be inferred by the reader as it is rarely stated outright. To infer a theme, one must consider the entire text. Then, as a cross check of this thematic inference, one might use several specific sentences as evidence. Macro-level inferences are those inferences made between the sentence and passage level.



This macro and micro structure can be represented in our diagram with the same visual structure as used for the logical-emotional characteristics.

In outline form the structure would be as follows:

1. Inferring
 - 1.1 Backward
 - 1.1.1 Cohesive Inference
 - 1.1.1.1 Scale

- 1.1.1.1.1 Micro
- 1.1.1.1.2 Macro
- 1.1.1.2 Process
 - 1.1.1.2.1 Logical
 - 1.1.1.2.2 Emotional
- 1.1.2 Elaborative Inference
 - 1.1.2.1 Scale
 - 1.1.2.1.1 Micro
 - 1.1.2.1.2 Macro
 - 1.1.2.2 Process
 - 1.1.2.2.1 Logical
 - 1.1.2.2.2 Emotional
- 1.2 Forward
 - 1.2.1 Predictive Inference
 - 1.2.1.1 Scale
 - 1.2.1.1.1 Micro
 - 1.2.1.1.2 Macro
 - 1.2.1.2 Process
 - 1.2.1.2.1 Logical
 - 1.2.1.2.2 Emotional

This leaves us with a taxonomy that can be navigated in a logical manner, and therefore is easier to utilize from memory than the thirteen classes of inferences suggested by Graesser, Singer, and Trabasso (1994). In fact, each of these thirteen classes of inferences could be placed within this taxonomy in logical and efficient manner.

While it would be beyond the scope of this paper to do that, let's look at where a few types of inferences already mentioned would fit.

The example given earlier of inferring the theme of a text would be a *backward:elaboration:elaborative:macro-level* inference. Whether the theme was a logical or emotional inference would depend on the specific text. Some themes are more logically derived while others are based more on an emotional response.

Let's analyze this further. A theme would be a *backward* inferences because it is derived from reflecting upon what has already been read. It would be an *elaboration* because while themes can deepen an understanding of a piece, most texts can be understood without being able to articulate its theme. Since it is a *backward* inference that is an *elaboration*, it has to be an *elaborative* inference and not the *forward* facing *predictive* inference. Finally, inferring the theme would certainly be a *macro-level* inference because it requires consideration of the text as a whole.

The other example that was given earlier of linking *He* to *Bob* in the sentences *Bob went to the store. He bought an ice cream.* would be an example of a *backward:cohesive:micro-level:logical* inference. This type of inference is *backward* because it involves repairing meaning of something that has been read. It is *cohesive* because in order to understand who got the ice cream one must infer that *He* refers to *Bob*. It is *logical* because one would use logic rather than an emotional response to link the pronoun to its proper noun.

This taxonomy is not intended to replace Graesser, Singer, and Trabasso's thirteen classes of inferences, rather it serves a different purpose. The purpose here is to provide a structure that both deepens understanding of the full scope and range of inferring, and allows one to logically and efficiently categorize inferences without the need to reference external sources. Toward that end, the above taxonomy of inferring is offered.

References

- Allbritton, D. (2004). Strategic production of predictive inferences during comprehension. *Discourse Processes, 38*(3), 309–322.
- Barnes, M. A., Dennis, M., & Haefele-Kalvaitis, J. (1996). The effects of knowledge availability and knowledge accessibility on coherence and elaborative inferencing in children from six to fifteen years of age. *Journal of experimental child psychology, 61*(3), 216–41. doi: 10.1006/jecp.1996.0015
- Bowyer-Crane, C., & Snowling, M. J. (2005). Assessing children's inference generation: what do tests of reading comprehension measure? *The British journal of educational psychology, 75*(Pt 2), 189–201. doi:10.1348/000709904X22674
- Casteel, M. A. (1993). Effects of inference necessity and reading goal on children's inferential generation. *Developmental Psychology, 29*(2), 346–357. doi:10.1037//0012-1649.29.2.346
- Chikalanga, I. (1992). A suggested taxonomy of inferences for the reading teacher. *Reading in a Foreign Lanugage, 8*(2), 697–709.
- Dorn, L. J., & Soffos, C. (2005). *Teaching for deep comprehension: A reading workshop approach*. Portland, ME: Stenhouse Publishers.
- Fountas, I. C., & Pinnell, G. S. (2006). *Teaching for comprehending and fluency: Thinking, talking, and writing about reading*. Portsmouth, NH: Heinemann.
- Graesser, A. C., Singer, M., & Trabasso, T. (1994). Constructing inferences during narrative text comprehension. *Psychological review, 101*(3), 371–95. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/7938337>
- Kintch, W. (1998). *Comprehension: A paradigm for cognition*. Cambridge, MA: Cambridge University Press.
- Pottle, R. (2012). Exploring, mapping, & measuring literacy cognition. Manuscript Submitted for Publication.
- Smith, E., & Hancox, P. (2001). Representation, coherence and inference. *Artificial Intelligence Review, 15*, 295–323.