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Parallels between distinct regions are intriguing. They suggest previously unsuspected unities. For instance, the parallels among the laws of radiation, magnetism, and electricity. Of course, we may impose a parallel upon two regions suggesting an unreal unity. For instance, paralleling laws of historical development and human social organization along the lines of biological evolution suggests an unreal unity between culture and biology. Thus, parallels suggest unities, but the unities should always be approached with a questioning-attitude. It is with this attitude that I wish to approach the parallel hypotheses presented by E.D. Hirsch, Jr., and E.H. Gombrich about the history and psychology of verbal and pictorial representation, respectively. The parallel aspect of these hypotheses raise important questions about cognitive processes connected with verbal and pictorial structures: Is there one cognitive process underlying reading words and seeing pictures? Do reading and seeing pictures appear to the mind in the same way?

If we synthesize the work of Hirsch and Gombrich, we arrive at yes-answers to both questions. This result is surprising. It counters the common assumption that verbal and pictorial representation are very different modes of cognition. The old saying "a picture is worth a 1,000 words" may be literally true. Pictures may be dense versions of written verbal representations. So, thinking pictorially and thinking verbally may be one mental process. This, then, is the purpose of my paper: to raise questions about a possible unity between picturing and verbalizing suggested by parallels in the work of Gombrich and Hirsch.

#### 1. Hirsch on Composition:

Hirsch asks: are there universal rules for composition? His answer involves developing a theory of the psychology of reading and applying this theory to the history of composition and the process of reading. The history of written language progresses toward increasing readability. The more easily a passage can be read, the more readable it is. The less time one can see through a passage, as it were, the more easy it is to read. Thus, principles of style--developed by a process of trial-and-error throughout the history of writing--tend towards 'economy', 'simplicity', 'variety within unity'... for the purpose of conveying the author's thought (including intentionally obscure and complex thought). In short: "...relative readability is an intrinsic and truly universal norm of writing".<sup>1</sup>

This thesis of the universality of the goal of increasing readability is intertwined with the hypothesis of "linguistic universals". The mind processes all written texts in the same way. For instance, the mind looks for patterns that when not found lead to uncertainty; and when too often found lead to inattention:

To avoid wasteful attention shifts, the verbal theme of one phrase must be similar to the theme of the preceding phrase. The expectancies set up by one phrase should be fulfilled in the next...<sup>2</sup>

At this point, the reader may wonder how verbal patterns appear in the mind? Do they appear as word-like? Hirsch has a provoking answer. The short-term memory holds verbal patterns almost literally. Consequently, the short-term memory which comes into immediate contact with the page, looks for similarity in verbal patterns for ease of retention. However, the long-term memory contains semantic contents and recalls the meanings through seeking thematic representations or labels that surround the meanings. From this difference in the ways short and long-term

memory process verbal patterns, two consequences occur for the reading of texts: 1)The short-term memory best operates on clauses--discrete units of verbal patterns that recur in the text.

Readability is enhanced when closure is rapid and stable, since rapid and stable closure greatly reduces both processing time and the burden on short-term memory.<sup>3</sup> 2)The long-term memory is stimulated by labels or "thematic tags" that refer to a variety of specific ways of verbalizing meanings.

Since the meaning of the whole discourse (remembered and expected) is mainly stored in a nontemporal, nonlinguistic form, the writer will assist the reader by continually repeating a rather small number of thematic tags which represent that remembered (and expected) holistic meaning...<sup>4</sup>

In short, the process of reading involves the application of nonlinguistically stored semantic contents to verbal patterns that require repetition for storage in the short-term memory. Without enough repetition of verbal patterns, the short-term memory cannot grasp the text in order to transfer the semantic contents to the long-term memory. However, with too much repetition, the mind loses attention. Likewise, without the use of labels, semantic contents cannot be recalled for application to specific verbal patterns; but with the use of too many labels too often, semantic contents become dulled.

Hirsch's theory of readability may be extrapolated to a theory of how thoughts appear in the mind: how does the mind's eye see thoughts? We think with nonlinguistic semantic contents. The mind's eye sees nothing, but the mind's 'hands' shape semantic contents. Words stimulate and simulate nonlinguistic thinking. For instance, readability depends upon striking a balance between the use of thematic tags and specific, recurrent, verbal patterns: thematic tags set up a context of expectations, and recurrent verbal patterns fulfill and modify those expectations. This way of structuring texts simulates the process of specifying and modifying general meanings: our thinking involves the formation of general themes that are applied to specific situations--and so, thinking in 'themata' involves setting up expectations that when unsatisfied leads to the refashioning of those 'themata'. Thus, the more readable a text is the more recognizable is its illusion of thought-processes: the formation and refashioning of semantic worlds or themata.

In short, my extrapolation of Hirsch's theory of readability to cognitive processes is this: thinking may be a nonlinguistic process of which verbal patterns provide an illusion; the greater the illusion, the more readable the text--the more transparent the meaning or thought. Though we don't think in words, we think with words: words, by simulating cognitive processes, provide a track for directing and improving our cognitive processes.

I will come back to this theory of the illusory nature of verbal representation after turning to Gombrich's parallel discussion of the representative nature of pictorial illusion.

#### 2. Gombrich on Pictorial Representation:

Most people assume that looking at real objects is radically different from looking at pictures. Gombrich has taught us that this natural way of thinking about pictures is mistaken. The mental processes involved in looking at pictures and objects are the same: both involve expectations, corroborations, and counter-expectations. This surprising theory of the cognitive processes involved in perception provokes the question: how do we ever tell the difference between pictures and objects? The answer is obvious: when you try to put your head through a painting of an open window, the canvass

or wall gets in the way:

...we still experience some kind of illusion when we see a picture on a wall or in a book --from a point, that is, where the perspective should go wrong. Here as always we first read the picture for consistency, and this consistency, the interaction of clues, is not wholly upset by our changing viewpoint. The painting may cease to be consistent with the world around it, but it remains closely knit within its own system of references.<sup>5</sup>

I want to explain Gombrich's theory in some detail--in order to bring out its parallels with Hirsch's theory. In seeing pictures, according to Gombrich, our minds match the conventionalized modes of representing reality against the picture; and match the picture against reality. Our minds test the degree of recognizability of the picture. Moreover, the history of pictorial representation in art is a history of making and matching. The cognitive process of making and matching has an overflow into the nature of veridical perception: we find that veridical perception also involves making and matching. Just as in painting pictures, artists use conventional schemata as hypotheses about how we see reality, so too in attempting to see objects and events in the real world, our mind employs hypothetical schemata that are either corroborated or refuted by reality:

It is the power of expectation rather than the power of conceptual knowledge that molds what we see in life no less than in art...Every time we scan the distance we somehow compare our expectation, our projection, with the incoming message. ...Here as always it remains our task to keep our guesses flexible, to revise them if reality appears to contradict, and to try again for a hypothesis that might fit the data.<sup>6</sup>

By now the thesis of the inferential nature of perception is well-known. However, this thesis raises an important but unasked question about the nature of mental representations: how does the mind's eye see the correction of false visual hypotheses? Does the mind see pictures that are redrawn?

For theoretical reasons the answer is no: the mind's eye sees nothing; rather, the mind's hands reshape nonvisualized hypotheses about the world. Given Gombrich's theory that pictorial representation has a history because the mind makes and matches visual schemata against reality, it follows that the visual schemata teach us how to see:

...The wish to find confirmation of some new experiment may make the progressive suggestible and may thus facilitate the artist's task of modifying his code...we genuinely recognize pictorial effects in the world around us, rather than the familiar sights of the world in pictures.<sup>7</sup>

The fact that pictures sometimes teach us how to see, falsifies the commonly held thesis that in painting we copy our internal three-dimensional mental pictures onto a two-dimensional plane. No recognition of reality could be possible if we were only copying our mental images when we paint--we could only see reflections of our minds rather than reflections of reality (and reflections of art in reality). Since painted images of reality both deceive and inform the eye<sup>8</sup>, we learn how to see reality by way of testing our pictorial representations and nonvisualized internal (mental) schemata informing our visual expectations against reality. When 'introspecting' upon the process of correcting mental schemata, though we 'see' nothing, we feel the impact of our mind's hands reshaping those non-visualized schemata that reset our expectations about visual reality.

At this point, one may wonder: do we ever have mental images? Taking off from Gombrich's theory of making pictorial schemata and matching them against reality for recognizability, I hypothesize that we learn to have mental images by introjecting visualized pictorial schemata. The mind's eye is a construct derived from seeing representational pictures. Consequently, there is no natural way of seeing reality: no fixed repertoire of mental images that we attempt to impose upon reality. Rather, we learn to see reality in specific ways through the construction and testing of visualized hypotheses or pictures. We learn to have different forms of mental images by introjecting different schemata.

In short, if we could construct a camera for taking pictures of mental images, we would only see copies of introjected pictures. When the mind is actively seeing--probing reality--it employs non-visualized projections of reality: the mind 'feels' reality with 'mental shapes' that are refashioned by the way of the process of making and matching.

### 3. Parallels between Reading and Seeing-Pictures:

For the sake of brevity, I tabulate the parallels between Hirsch and Gombrich:

Questions/Answers	Hirsch	Gombrich
How does the history of _____ progress?	composition	pictures
By making and matching schemata for _____.	readability,	recognizability.
How do we read _____ see _____	texts?	pictures?
By testing anticipations against the _____.	text.	picture.
----Extrapolations----		
How do the mental contents of _____ appear in the mind?	verbal/	pictorial/ schemata
They appear as _____ contents (schemata).	non-linguistic	non-visualized
How does the mind correct its internal schemata?		
By matching its schemata against introjected _____.	verbal/	pictorial/ representations

These parallel questions and theses prompt the idea of a single process informing the two distinct areas.

### 4. Is there a common psychological process for reading and seeing-pictures?:

This question, suggested by the parallels between Hirsch and Gombrich, involves searching for a single mental process for the representation of reality through words and through pictures. Though both forms of representation--words and pictures--have different manners of referring to reality, we wonder whether they are grasped and used by the mind in one way with one mental operation. For instance, according to Nelson Goodman<sup>9</sup>, though pictures and words are non-notational (i.e. unlike musical scores where each note on a scale stands for a specific sound), but words not pictures are syntactically and semantically differentiated. In plain words, words are distinct and refer to distinct regions of reality; but pictures contain forms that merge and refer to overlapping areas of reality. However, the question we ask here seeks to uncover a common mental process for grasping the very different symbolic systems of words and pictures. How could this common mental process work, if it were to exist?

The cognitive contents of mind are nonsymbolic and nonrepresentative. Our minds shape its contents by simultaneously introjecting and retrojecting verbal or pictorial patterns. Our minds project shapes upon reality that are perceptually refined by the use of introjected pictorial schemata and counter-expected verbally coded perceptions. The flexible mental fields of our minds take on increasing representative content through using mismatches of introjected verbal/pictorial schemata, and mismatches of reality, to reshape the mental fields.

In sum: synthesizing the theories of Hirsch and Gombrich permits us to seek for an unified mental process for thinking and seeing. The process may be this: We probe reality with simulations of thinking--words--and simulations of reality--seen--pictures. These probes occur in the mind as projected nonsymbolic fields and appear to the mind's eye as introjected verbal patterns and pictorial schemes. It is easy to confuse the introjected contents of our mind with the actual mental processes of thinking/seeing: the process of holding and shaping contents with our mind's 'hands'.

#### NOTES

1. p.89, E.D.Hirsch, Jr., The Philosophy of Composition (Chicago, University of Chicago Press, 1977)
2. p. 107, ibid.
3. p. 119, ibid.
4. pp. 123-124, ibid.
5. p.227, E.H.Gombrich, Art and Illusion(New Jersey, Princeton University press, 1961).
6. p.225, ibid.
7. p.237, Gombrich, "Visual Discovery through Art", ed. James Hogg, Psychology and the Visual Arts (Harmondsworth, Penguin, 1969) 215-238.
8. See p.314, Gombrich, op.cit.
9. Nelson Goodman, Languages of Art (Indianapolis, Bobbs-Merrill, 1968); Sheldon Richmond, "A Discussion of Some Theories of Pictorial Representation", Dialectica, 34, 3 (1980) 229-240.