

# The double constraints of convention and cognition in successful graphic design

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CIDI2013 – Recife, Brazil – 6th Information Design International Conference – 5th InfoDesign Brazil  
Wednesday, 11 September 2013

Link to PDF of full paper: <http://bit.ly/12zLinL>

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*cognition, context, convention, shared knowledge, working memory*

*Using insights from cognitive psychology this paper develops a theoretical orientation to graphic design critical of Bertin's structuralist doctrines, but highly respectful of the insights offered by art historians like Ernst Gombrich, who stress the sociality and cultural contingency of visual forms. The paper discusses the constraints imposed by cultural expectations as well as the universal constraints imposed by working memory. Cognitive science has found that closure must occur in any perception within a stringent time limitation of just a few seconds. While this time limitation cannot be overcome directly, the designer can employ culturally conditioned devices that minimize its adverse effects. This speed-up effort can be aided by taking into account the finding that visual experience is unconsciously attended by a verbal component – a duality that should be exploited even when designing a mute visual artifact such as a poster. In sum, perception is construction, and an effective graphic can overcome the inherent polysemy of signs and forms only by exploiting the shared knowledge that is quickly available to the viewer's mind within a specific cultural moment. Visual examples, including subway maps, and an 1869 historical map are used to illustrate the key concepts of the paper.*

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## Special thanks

Prof. E.D. Hirsch, Jr. – Charlottesville, Virginia, USA

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**PINO TROGU – SAN FRANCISCO STATE UNIVERSITY USA**

**THE DOUBLE CONSTRAINTS OF CONVENTION AND COGNITION IN SUCCESSFUL GRAPHIC DESIGN**

CREDIT – RECIFE BRAZIL  
6TH INFORMATION DESIGN INTERNATIONAL CONFERENCE  
STI INFODISEN  
WEDNESDAY 11 SEPTEMBER 2013

*There really is no such thing as Art.  
There are only artists.*  
— Ernst Gombrich

**CONVENTION** **COGNITION**

**I. A BEAUTIFUL DESIGN THAT DID NOT WORK**

**New York Subway Map 1972 (1978)**  
The original map was considered too abstract and difficult to understand.  
New York City Transit Authority (1978)

**New York Subway Map 1979 (2013)**  
The map was redesigned to make it easier to understand.  
New York City Transit Authority (2013)

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**ART AND ILLUSION**  
COURSE IN GENERAL LOGICISTIC  
A book on Psychology of Art  
by Ernst Gombrich

**ERNST GOMBRICH**  
ART AND ILLUSION, 1960

**JACQUES BERTIN**  
SEMILOGY OF GRAPHICS, 1967

**JACQUES BERTIN**  
SEMILOGY OF GRAPHICS, 1967, 2004 p.419

**PERCEPTUAL SYSTEMS**  
The system is open to new meaning.  
Multi-dimensional perception.  
Verbal language  
Figure-ground image  
Mathematics  
Graphics

**immediate memory**  
short-term memory  
working memory

**ALAN D. BADDELEY**  
WORKING MEMORY, 1974

**2. THE PEEPHE or WORKING MEMORY**

**Working Memory** (site of awareness and of thinking)  
**Long-Term Memory** (factual knowledge and procedural knowledge)

**FIGURE 6: Just about the simplest model of the mind possible.**  
(Willingham, 2009)

**Environment** → Working Memory → Long-Term Memory

**Working Memory**

**A beautiful design that did not work**  
A subway map from 1972 was considered too abstract and difficult to understand. It was redesigned in 1978 to make it easier to understand.

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**My problem is that I have been persecuted by an integer.**  
GEORGE A. MILLER  
MAGICAL NUMBER SEVEN, 1956

**4-3-4-6-5-9-6-2-3**  
“chunks”  
**434-65-9623**

**CONCEPT MAP**  
ABSTRACT REFERS TO ABSTRACT

**ROAD MAP ANALOGY**  
ABSTRACT REFERS TO CONCRETE

**Seconds – Not items**  
Chinese students' mental math advantage: number words in Chinese have fewer syllables and thus take a shorter time to process.  
(Geary et al. 1996)

**3. THE DUALITY of WORKING MEMORY: THE VERBAL AND THE VISUAL**

**WORKING MEMORY MODEL**  
Visual-spatial sketch pad → Central executive → Phonological loop

**“NAMING” and SUB-VOCALIZATION**  
alpha eye

**VERBAL TEMPORAL**  
VISUAL  
SPATIAL

**THE GEICO GECKO advertisements**  
(Government Employee Insurance Company)

**4. CONVENTION AND CONTEXT (1): SHARED KNOWLEDGE**

**THE MYTH OF THE GIVEN**  
(Sellers, 2009)  
Every form we perceive is post-perception.

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**Every form we perceive is post-perception.**  
Every form we perceive is post-perception.

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**CFNINB**

**CNN FBI**  
(Willingham, 2009)

**007 JAMES BOND**  
Luke Plourde, 2011 (24.24 sq. in.)

**5. CONVENTION AND CONTEXT (2): POLYSEMY AND GENRE**

**RABBIT or DUCK?**  
(Gombrich, 1960)

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**GENRE CLASSIFICATION**  
(Roth & Lloyd, 1978)  
**“SHOT”**  
Genre & Context  
(Miller, 1999)

**“SHOT”**

**“SHOT”**

**“SHOT”**

**“SHOT”**

**The Dog That (Almost) Roared**

**Pioneer 10 NASA, 1972 (Gombrich, 1982)**

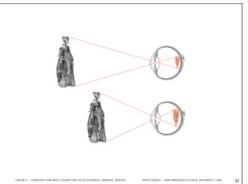
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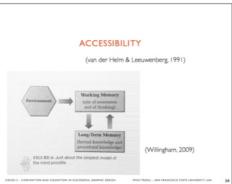
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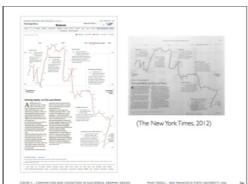
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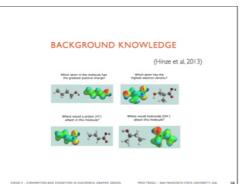
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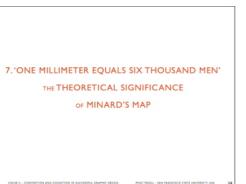
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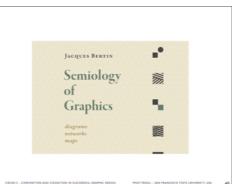
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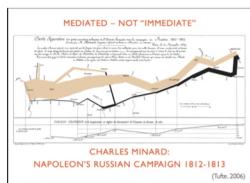
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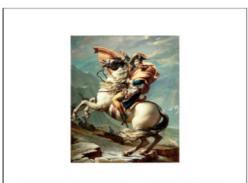
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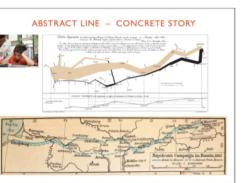
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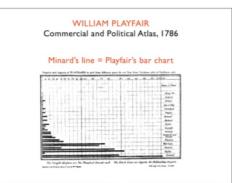
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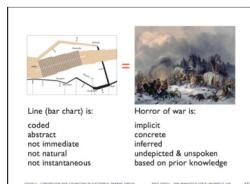
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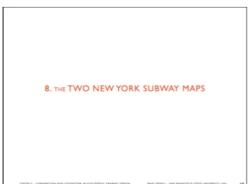
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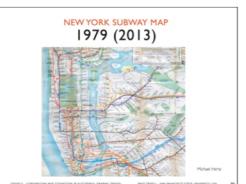
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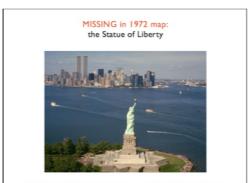
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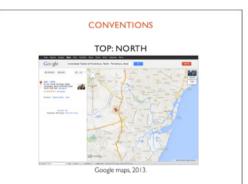
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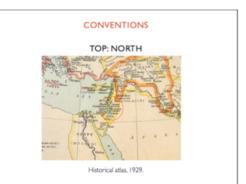
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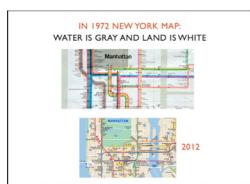
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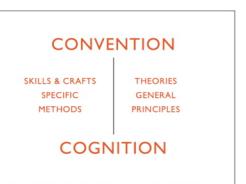
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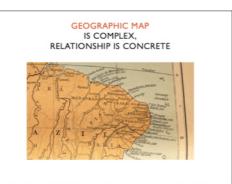
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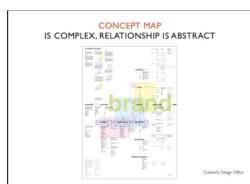
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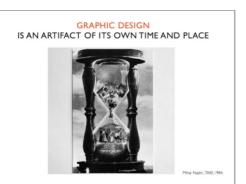
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