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Understanding the Role and Value of Interaction: First Steps

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Motivation

Visual Analytics strongly emphasizes the importance of interaction. However, until now, interaction is only sparingly treated as subject matter on its own. How and why interactivity is beneficial to gain insight and make decisions is mostly left in the dark. Due to this lack of initial direction, it seems important to make further attempts in facilitating a deeper understanding of the concept of interactivity. Therefore, different perspectives towards interactivity are discussed and cognitive theories and models are investigated. The main aim of this work is to broaden the view on interaction and spark further discussion towards a sound theoretical grounding for the field.

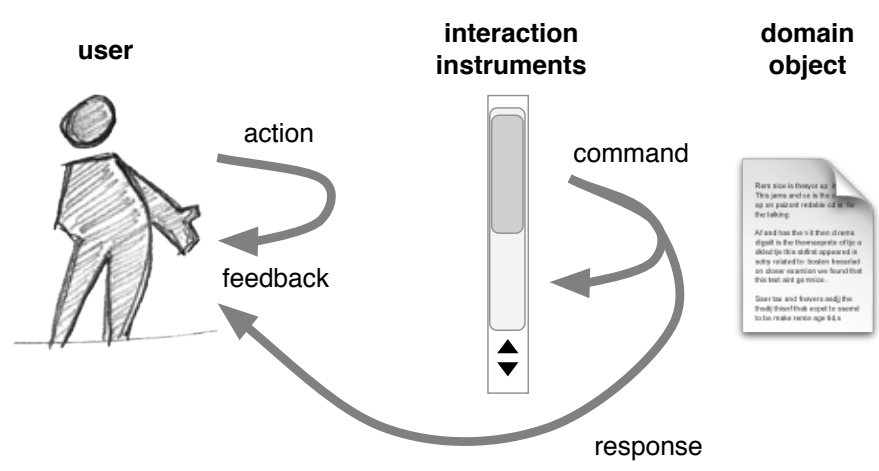## Two perspectives on interactivity [Stromer-Galley, 2004]

Interactivity-as-product

"Visual Analytics is the science of **analytical reasoning** facilitated by **interactive visual interfaces**."
[Thomas & Cook, 2005]

Interactivity-as-process

Instrumental interaction [Beaudoin-Lafon, 2004]

Interaction devices

Direct manipulation [Shneiderman, 1983]

Interaction techniques

Interaction intents [Yi et al., 2007]

select
explore
reconfigure
encode

abstract/elaborate
filter
connect

Computational Representational Understanding of Mind (CRUM) [Thagard, 1996]

Program
data structures
+
algorithms
=
running programs

Mind
mental representations
+
computational procedures
=
thinking

Traditional cognitivism

Formal Logic; Rules; Concepts; Analogies; Images; Connections

Criticism:
information processing loop is closed
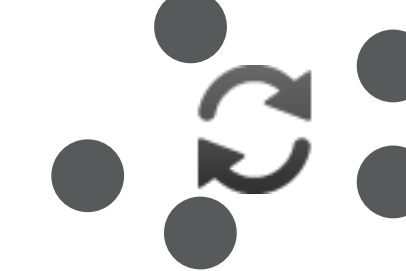difficult to take into consideration phenomena outside

Postcognitivist theories

Situated Action
[Suchman, 1987]

people acting in a situation

Distributed Cognition
[Hutchins, 1996]

cognitive system composed of individuals and artifacts

Activity Theory
[Leontiev, 1978]

(purposeful, mediated, human social) activity

Role & value of interactivity

the reduction of cognitive load
    reducing the gulfs of execution and evaluation

higher engagement
    feeling of being in control / first person-ness

a higher expressiveness of the user interface language
    richer possibilities for input and output

What's next?

cognitive interaction model
    as basis
        descriptive: the ability to describe a wide range of existing methods
        evaluative: enable the assessment of multiple design alternatives
        generative: help in designing new methods

collect empirical evidence
    via experiments

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