



Attention and Multimodality

Examples from Interaction with a Multimeter

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Goal

Development of generic rules in modality selection, integration and adaptation to support the design process of interactive systems.

In particular, portable devices for the measurement of electronical equipment.

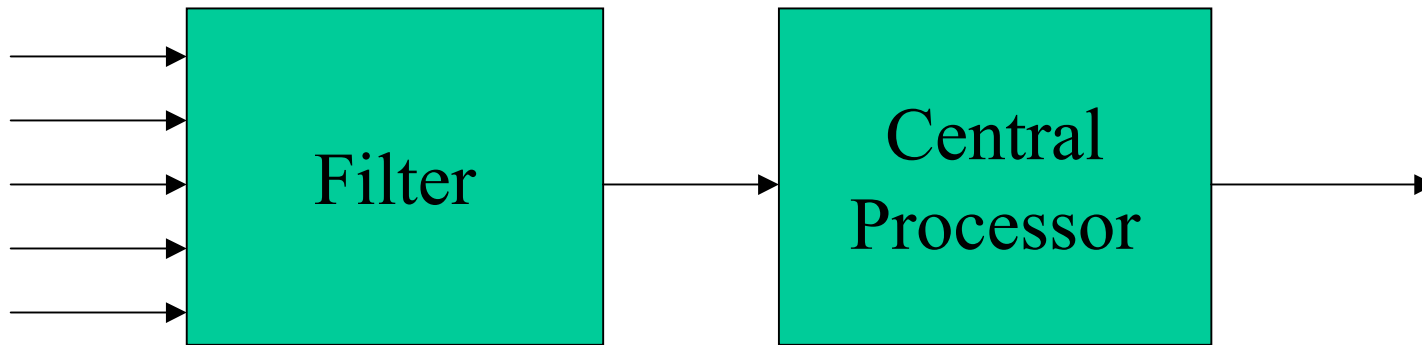
Prototypes based on these rules.

General Idea

Bring the message to the user

1. Relevant information w.r.t. a particular task should automatically be delivered into the receiver's space of attention.
2. Use particular characteristics of the message.
 - feedforward (what can be done)
 - feedback (what has been done)

Attention



Attraction of Attention

- Intensity/contrast of stimuli (sound, colours, smell, ...)
- Size of objects
- Repetition/Movement
- Emotional content
- Unexpectedness
- Goals/Task
- Level of Arousal (state of alertness)

eleanor% latex beoordeling.tex.....(*User Command*)
This is TeX, C Version 3.14t3.....(*Introduction*)
(beoordeling.tex.....(*Status Feedback*)
LaTeX2e <1994/12/01> patch level 3
Hyphenation patterns for english, dutch, american, german, loaded.
(/cadappl/tex/ver3.14/lib/tex/base/latex209.def Entering LaTeX 2.09 compatibility mode.)
Document Class: article 1995/01/31 v1.2y Standard LaTeX document class
(/cadappl/tex/ver3.14/lib/tex/base/size11.clo))
No file beoordeling.aux.....(*Corrective Feedback?*)
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(see the transcript file for additional information).....(*Feedforward*)
Output written on beoordeling.dvi (2 pages, 11660 bytes).....(*Completion Feedback*)
Transcript written on beoordeling.log.
To PostScript : dvitops beoordeling.dvi.....(*Feedforward*)
To preview with X : xdvi beoordeling.dvi.....(*Feedforward*)
eleanor%.....(*Turntaking*)

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Mode/Code Choice

Depends on, for instance:

- **User**
 - *perception*: deaf/blind/...
 - *cognition*: expectations/memory/goals/...
 - *location/direction*: head/hands/body/...
- **Communicative situation**
 - *channel*: noise, weather conditions
 - *other participants*: class, workshop, church
- **Message/Task**
 - *content*: ‘This is not a picture’
 - *relevance, urgency*: receipt of email vs. ‘fire!’

Electronics Workshop



Two basic types of action

- Observation

- goals:

- 1. **determination of broken device**

- 3. **evaluation of replacement**

- requires action

- movement of head and arms/hands
 - adjustment of multimeter

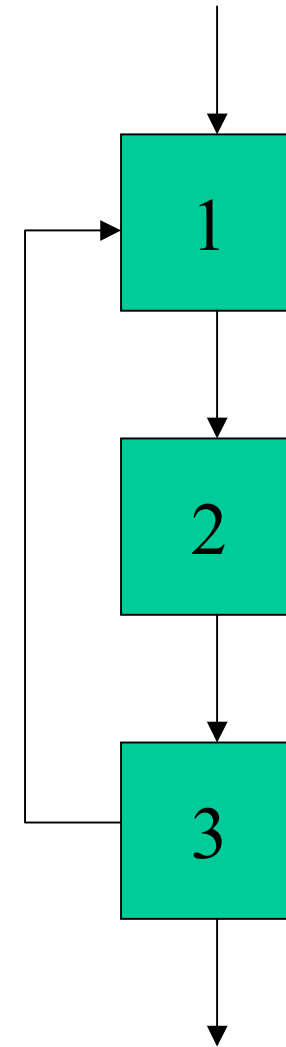
- Action

- goal:

- 2. **replacement of broken device**

- requires observation

- visual (location device, soldering-bolt, ...)
 - tactile (try with hand gloves!)



Feedback vs. Feedforward

Feedback (system respons)



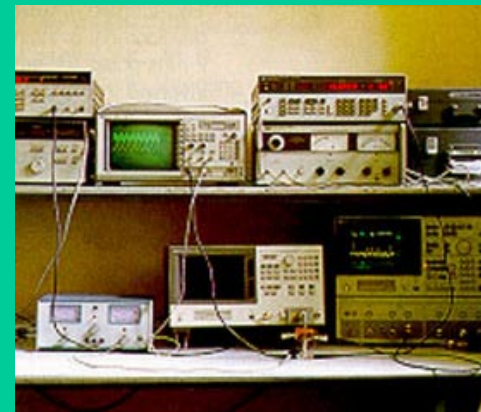
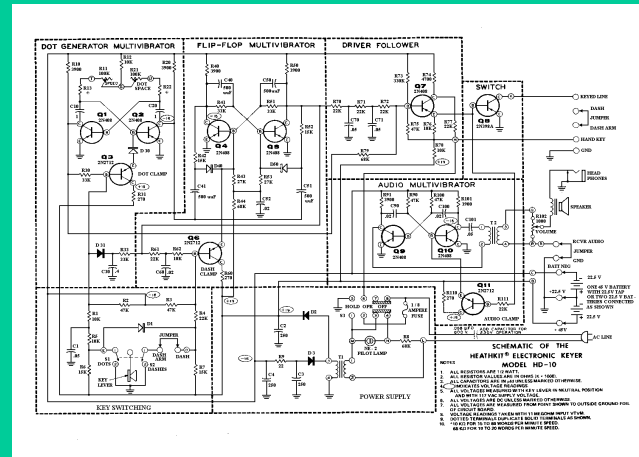
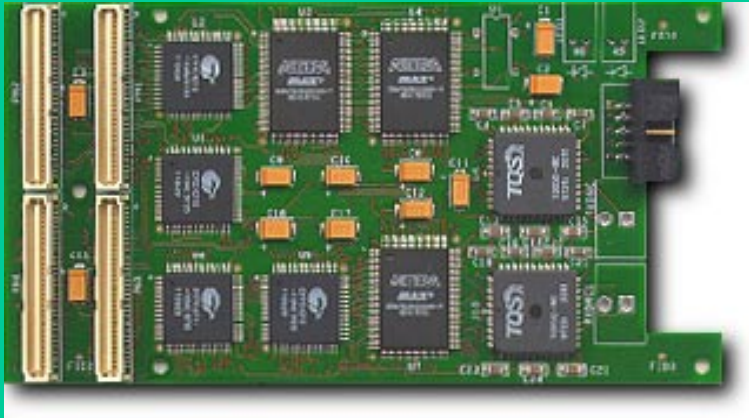
Feedforward (possible actions)



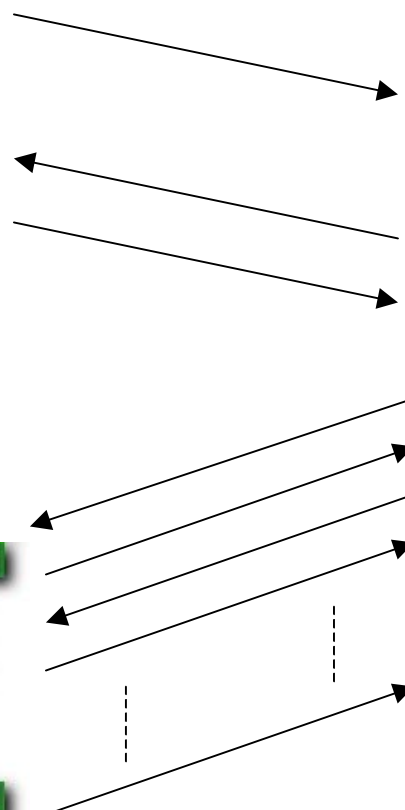
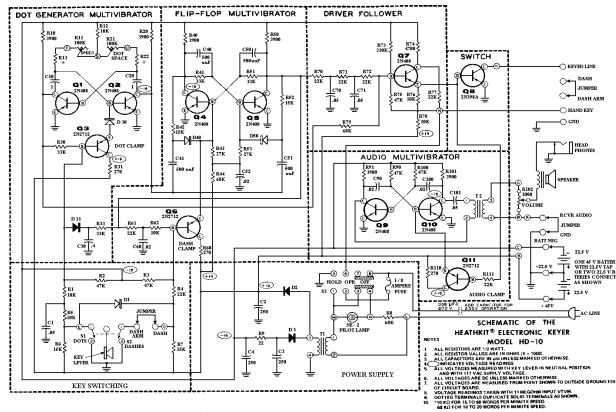
Sensory cues (observation)

- Vision
 - e.g. voltage, electrical scheme, probes
 - printed circuit (e.g. color codes, location and type of elements, fixation points, burned elements)
- Touch
 - button control
 - placement of probes
- Smell
 - burned elements

Attention Spaces



Attention changes (observation)



Conclusions/Hypothesis

- Delivering the relevant information into the attention space improves efficiency and the satisfaction of users.
- If well-tuned, multimodal presentation improves the delivery of relevant information inside the attention space.
- Multimodal presentation opens a way to adapt the presentation to the communicative situation, user characteristics and the task.
 - Needs frequent monitoring of circumstances and user
- Determination of relevant information requires a profound task analysis.