

Using Persuasive Technology to promote sustainable behavior



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Changing behavior by changing behavioral environment:

Persuasive technology intervenes in user-system interactions

- Technological environments shape human behavior
- Most energy consumption decisions are made in user -system interactions.



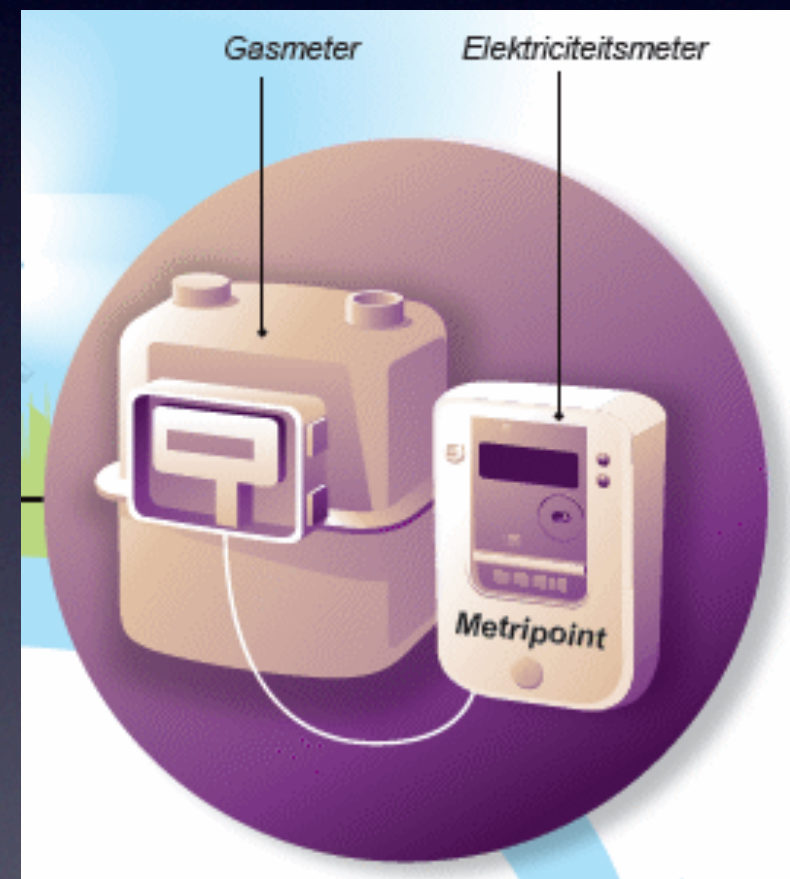
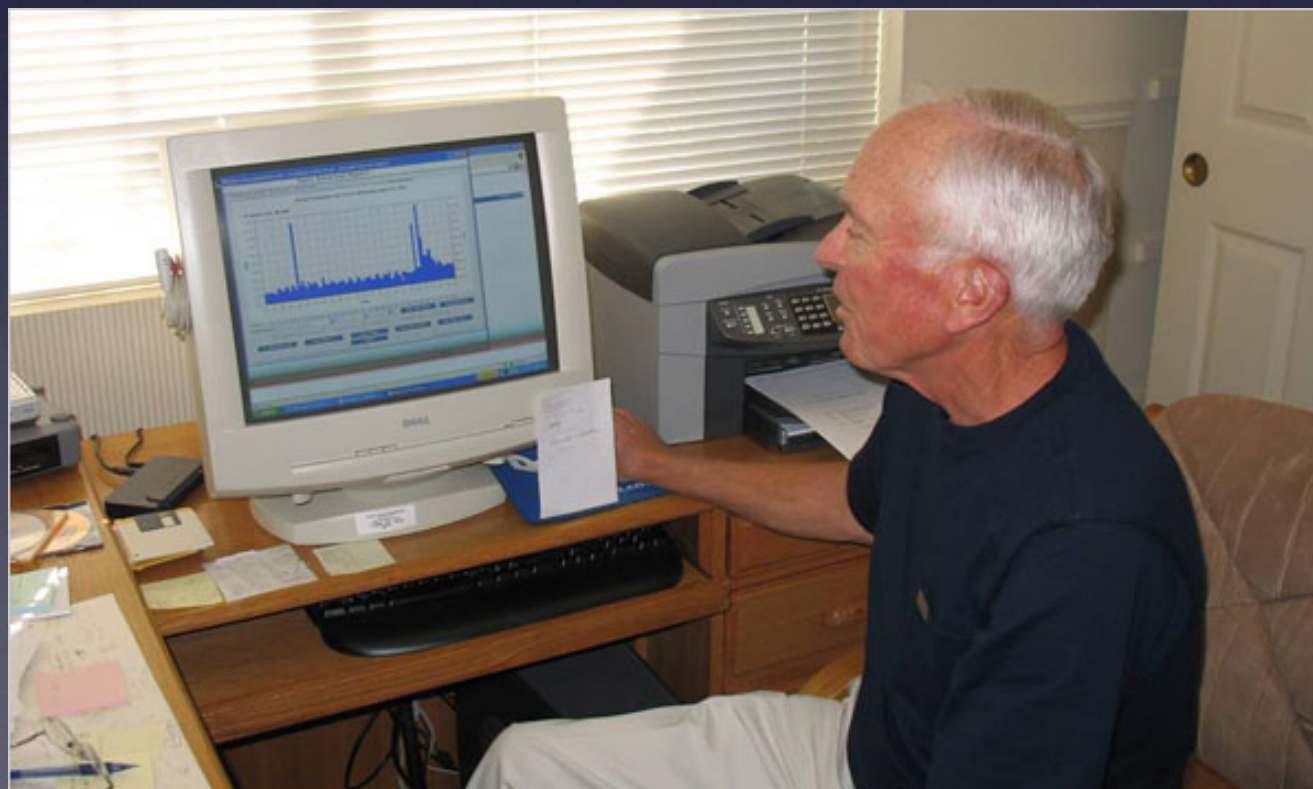
What is Persuasive Technology?

Any interactive intelligent system designed to change people's attitudes and/or behaviors (Fogg, 2003).

- intentional
- non-coercive > user in the loop
- interactive > responsive to user choices
- adaptive > to needs, type of use, context
- easy > low cognitive effort

Persuasive tools, experiences and social actors

Supportive tools



Ambient Persuasive Technology



T Nakajima et al,

Ambient Persuasive Technology



T. Nakajima et al,



Design : Har Hollands

Color intensity color meaning and color
presence of ambient light feedback

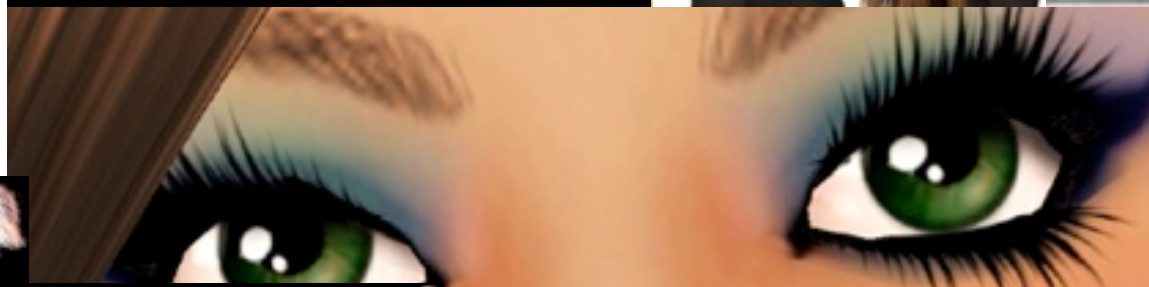
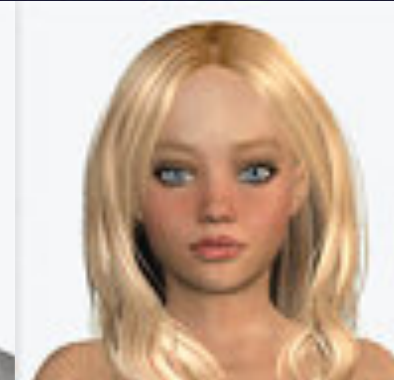


Action motivating experiences: experiencing virtual flooding risks



Ps walked through virtual polder
observed dike failures
observed dike breach
water with localized sound
flooding of own house (3 mt)
(Zaalberg & Midden, 2012)

Agents capable of social interaction



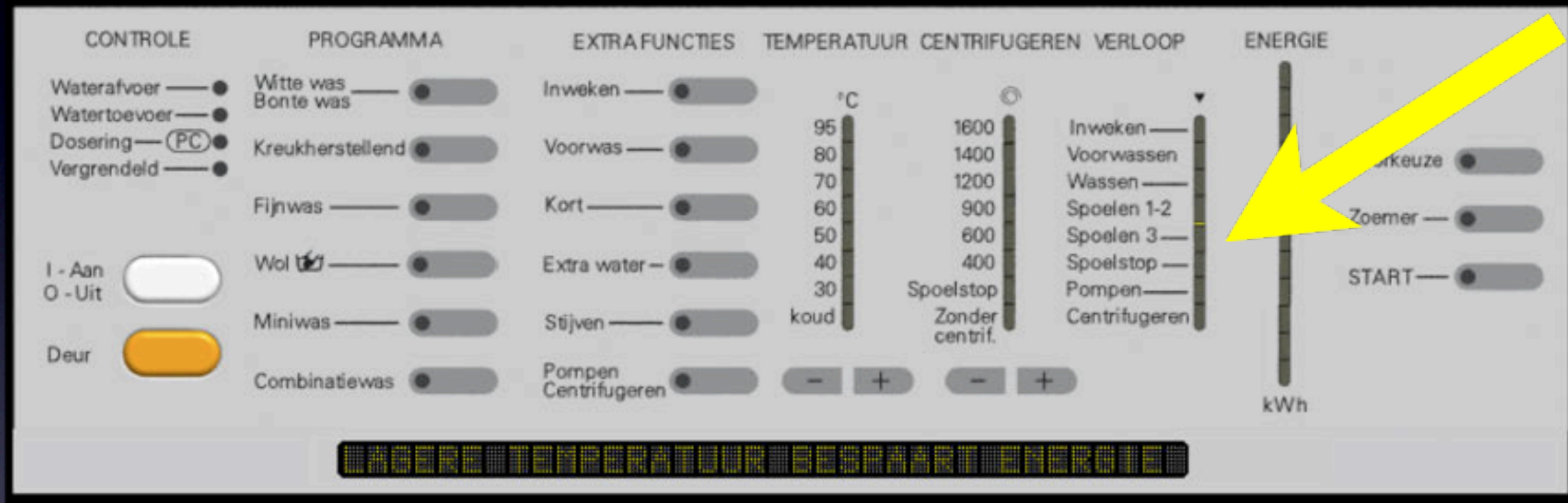


Feedback on energy use

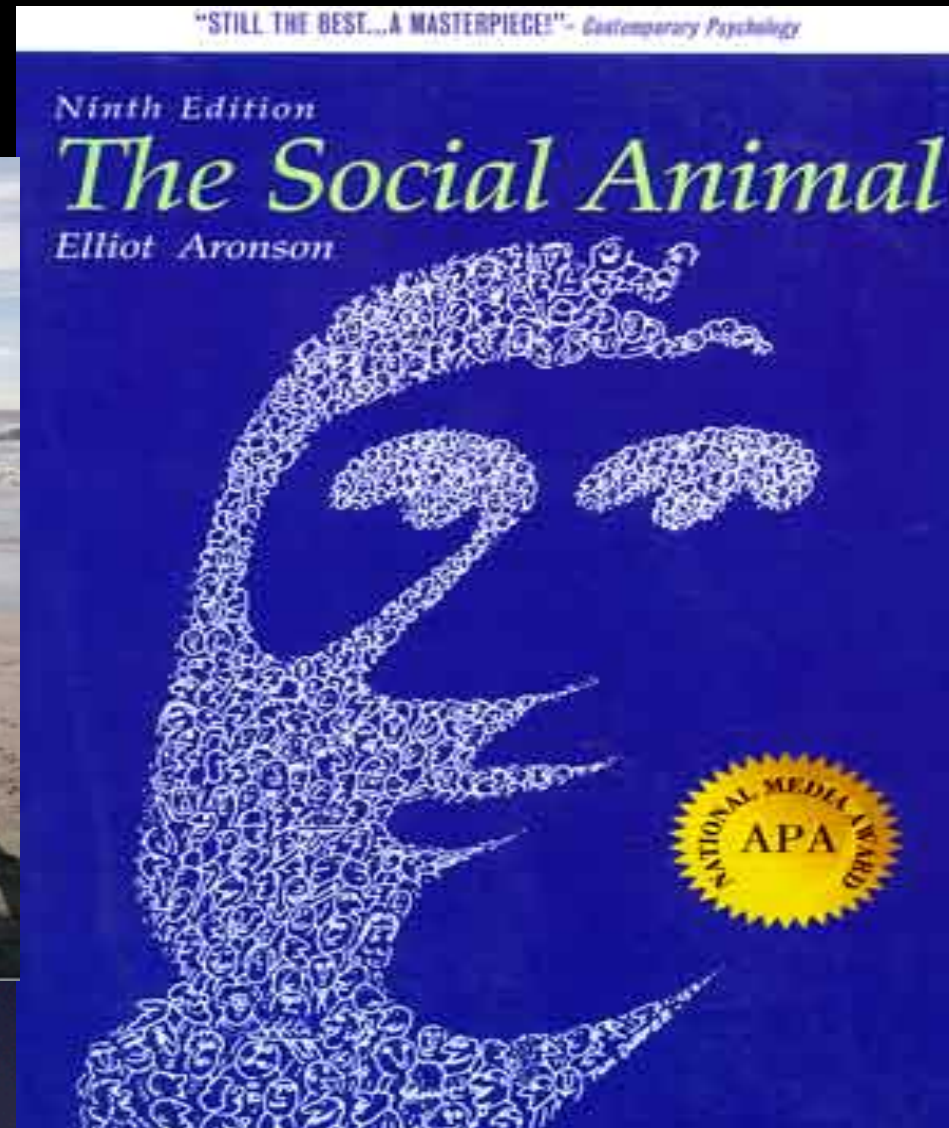
- Researched since late 70's
- Weekly or monthly messages about household consumption
- Ambivalent results: issues with **action-feedback links** and **feedback-goal links** (3-10%)
- Late 90's: **Interactive** feedback (McCalley & Midden, 2002, 2003)

Interactive feedback

(McCollay & Midden, 2002)



- User and action specific
- Immediate and interactive
- Effect: 18% energy saving



Persuasive social agents:
Can feedback systems change
behavior by exerting social
influence?

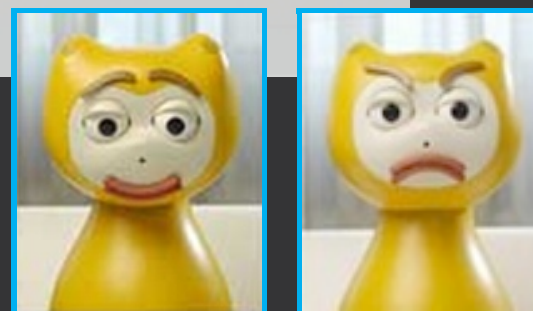
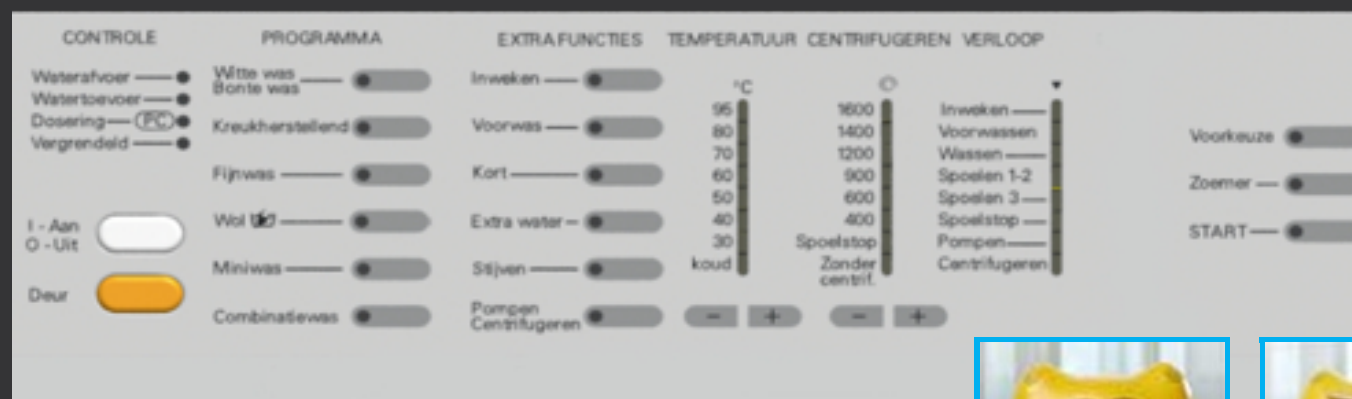
Hypothesis:

Social feedback from artificial persuasive agent promotes behavioral change.

- Interactive feedback

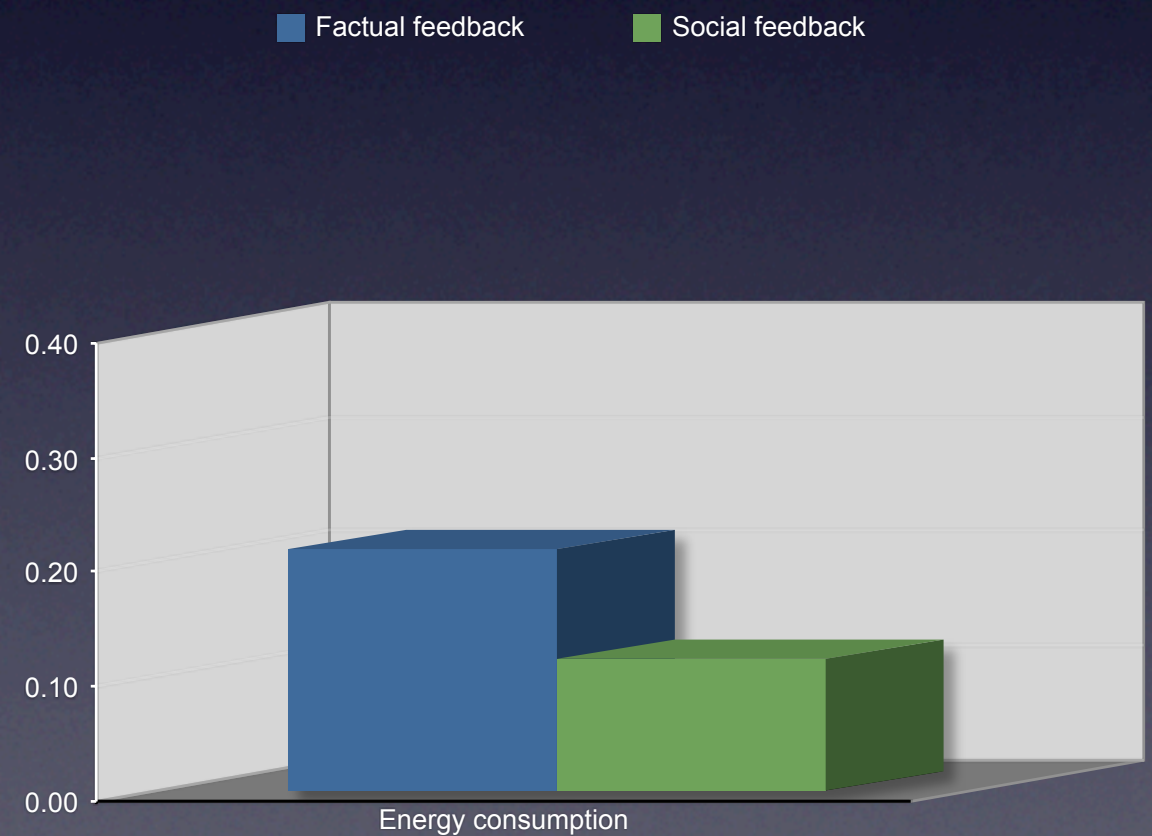


- Interactive social feedback



Social feedback saves energy

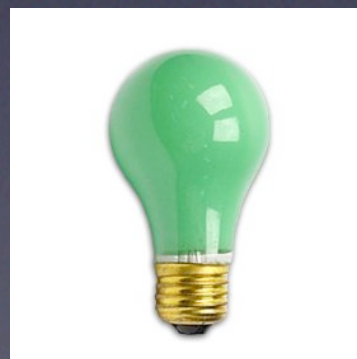
47% lower energy consumption!



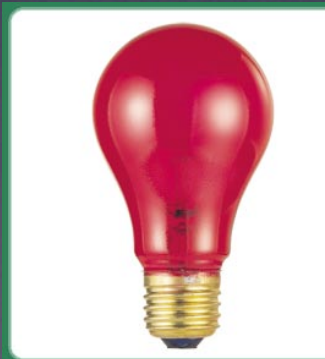
2. Factual vs Evaluative vs social feedback

- evaluative feedback refers to factual standard > enhances information value and ease of processing
- social feedback refers to social standard > enhances 'socialness'

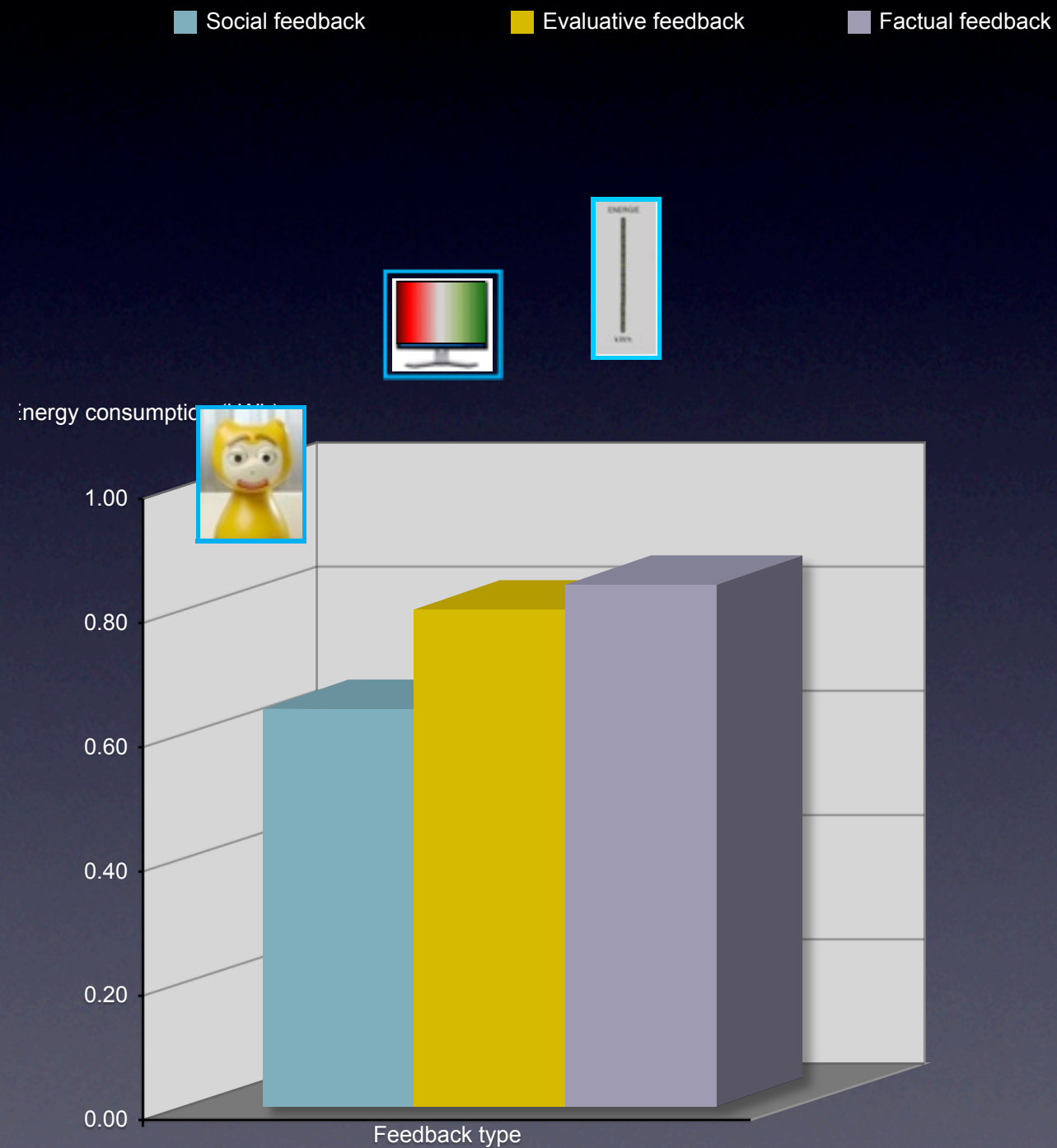
*Social
feedback*



*Evaluative
feedback*



Result: Social source makes the difference with factual feedback

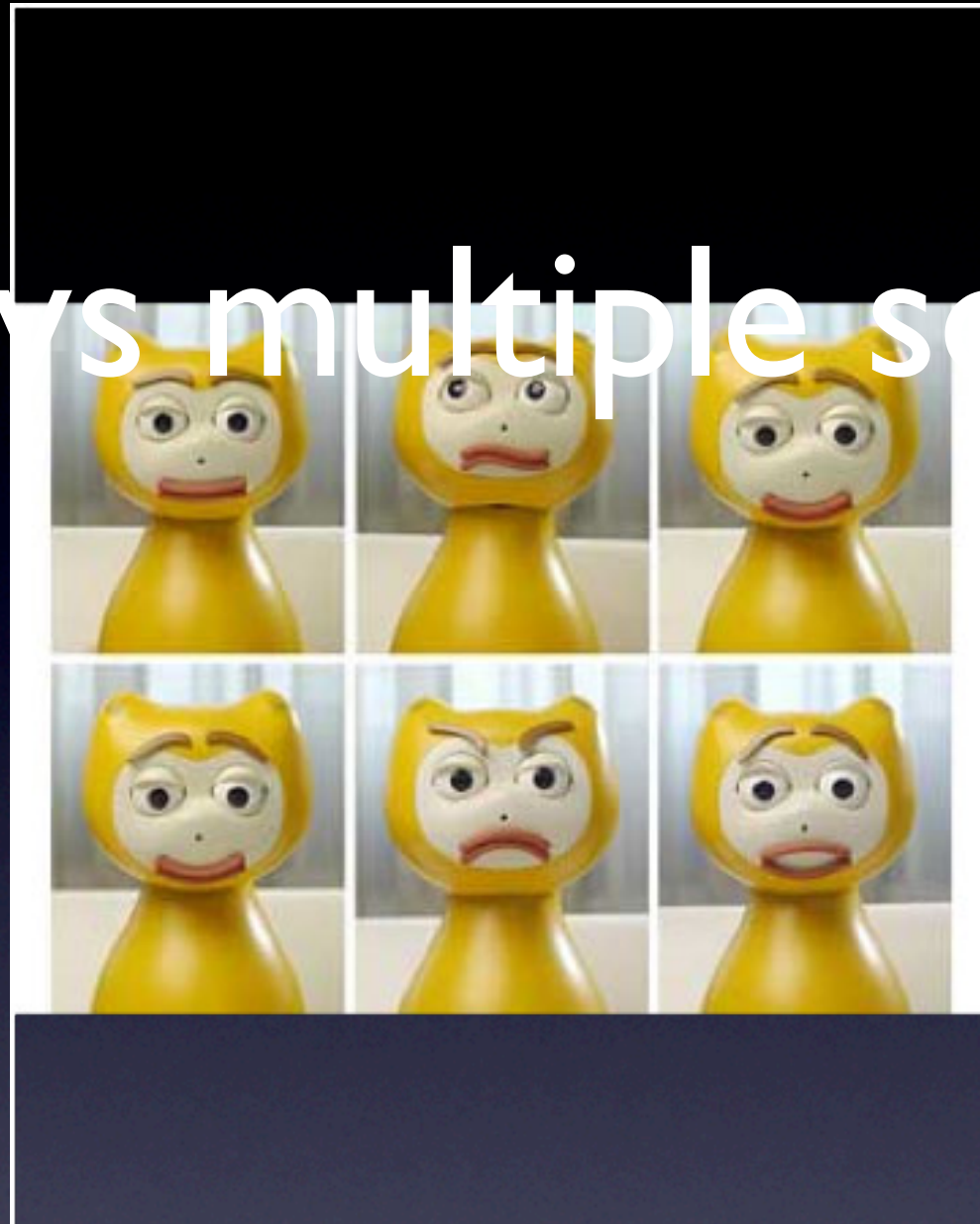


Smart systems as Persuasive social agents

- What happens in human-agent interactions to create the illusion of social interaction?
- Social realism may enhance social responses to artificial agents (through social verification; a.o. Blascovitch, 2002). Results mixed
- Social agency needed for meaningful interaction (Guadagno et al., 2007; Kraemer, 2008). Results mixed
- CASA: Simple social cues may evoke social attributions to source: e.g. language (Reeves & Nass, 1996 a.o.). Similarity effect, gratitude effect, in/outgroup effect



3. Single vs multiple social cues



Is a single feature triggering an automatic process or will multiple social features make an agent more social realistic?

Joint effect of two social cues: embodiment

Color

Speech

Computer

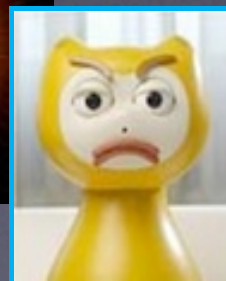
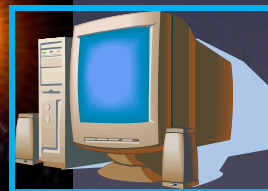
iCat

non-social/social

Embodiment

non-soc

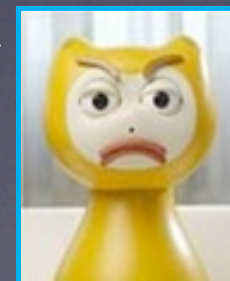
social



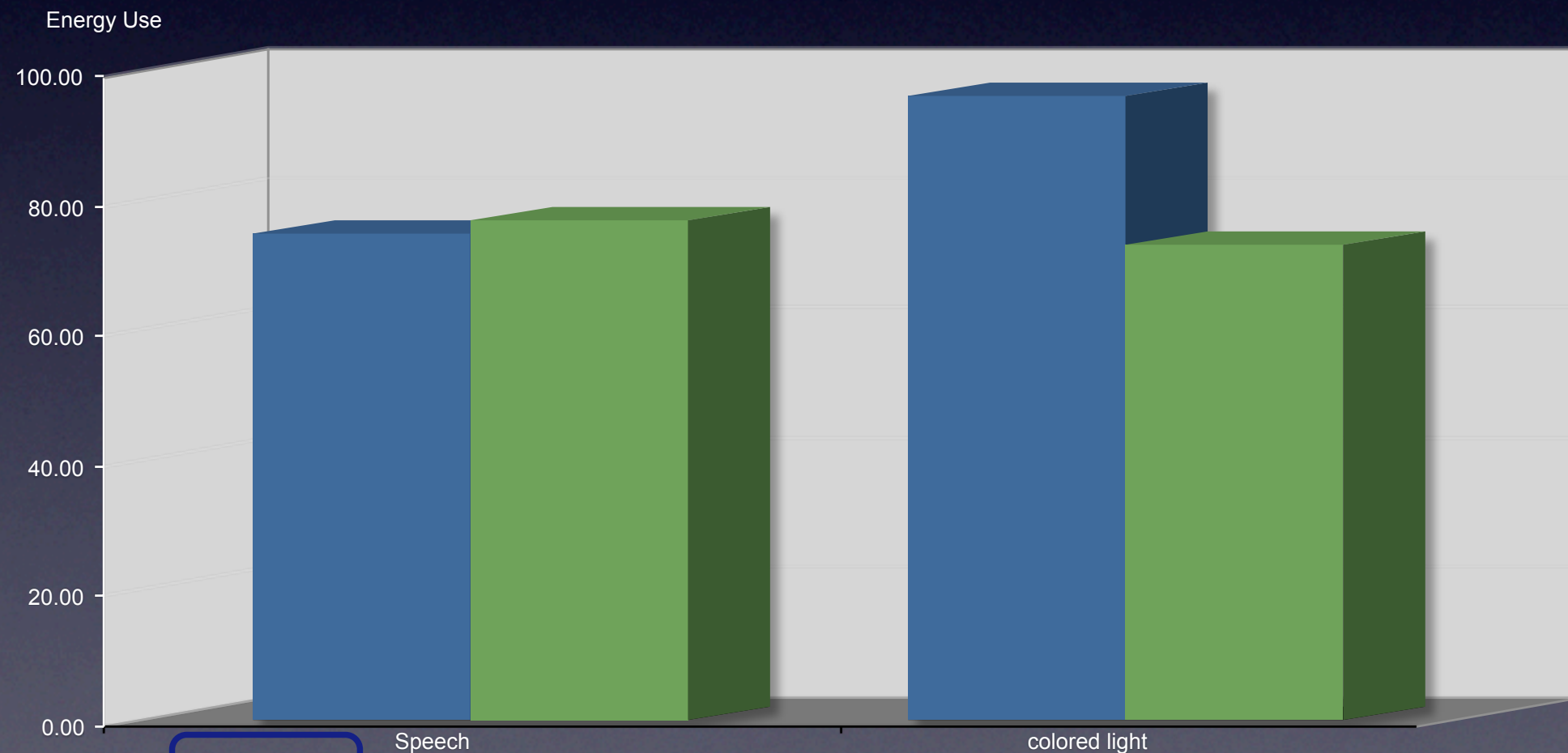
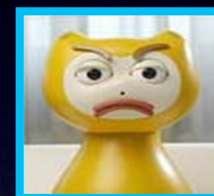
"very
bad"



"very
bad"



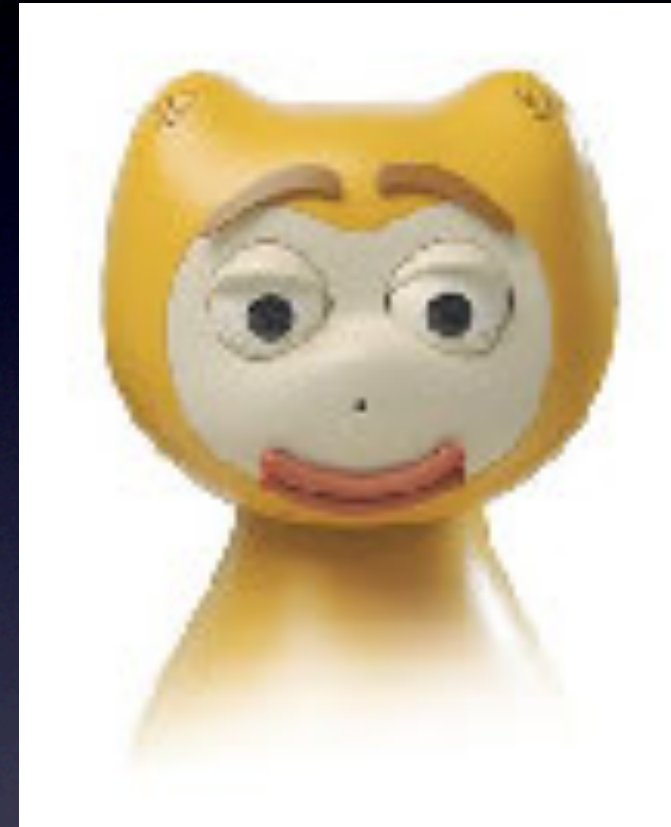
social cues on energy use: both work, one suffices: suggests
automatic triggering of script
suggests that one cues triggers a social script; social realism does
no add



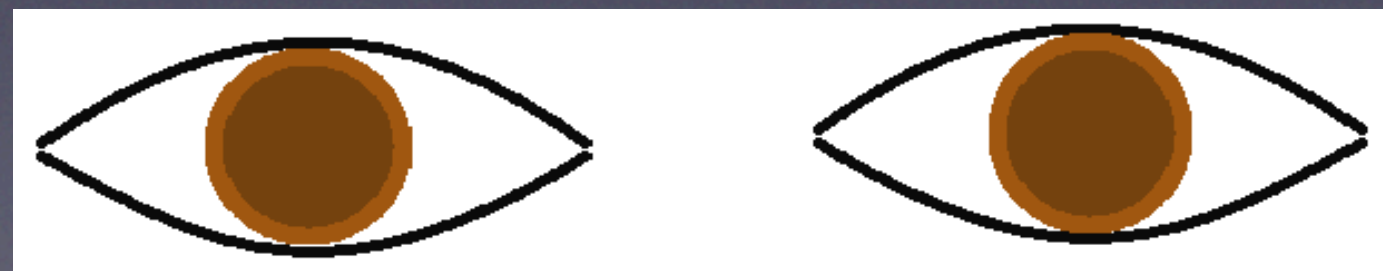
interaction:
 $F(1,76) = 11.802, p < 0.01$

Social agent vs watching eyes?

What makes the robot's social cues persuasive?



- Social realism or a basic social cue? Automatic association eyes-human presence? Feeling of being watched. (Bateson et al, 2006)

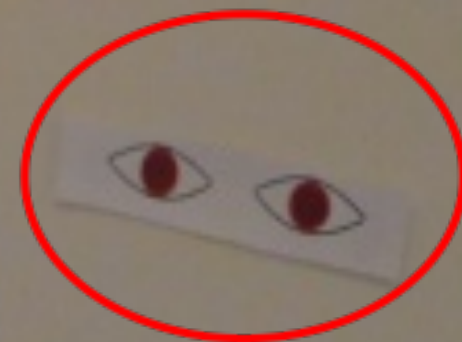




Control

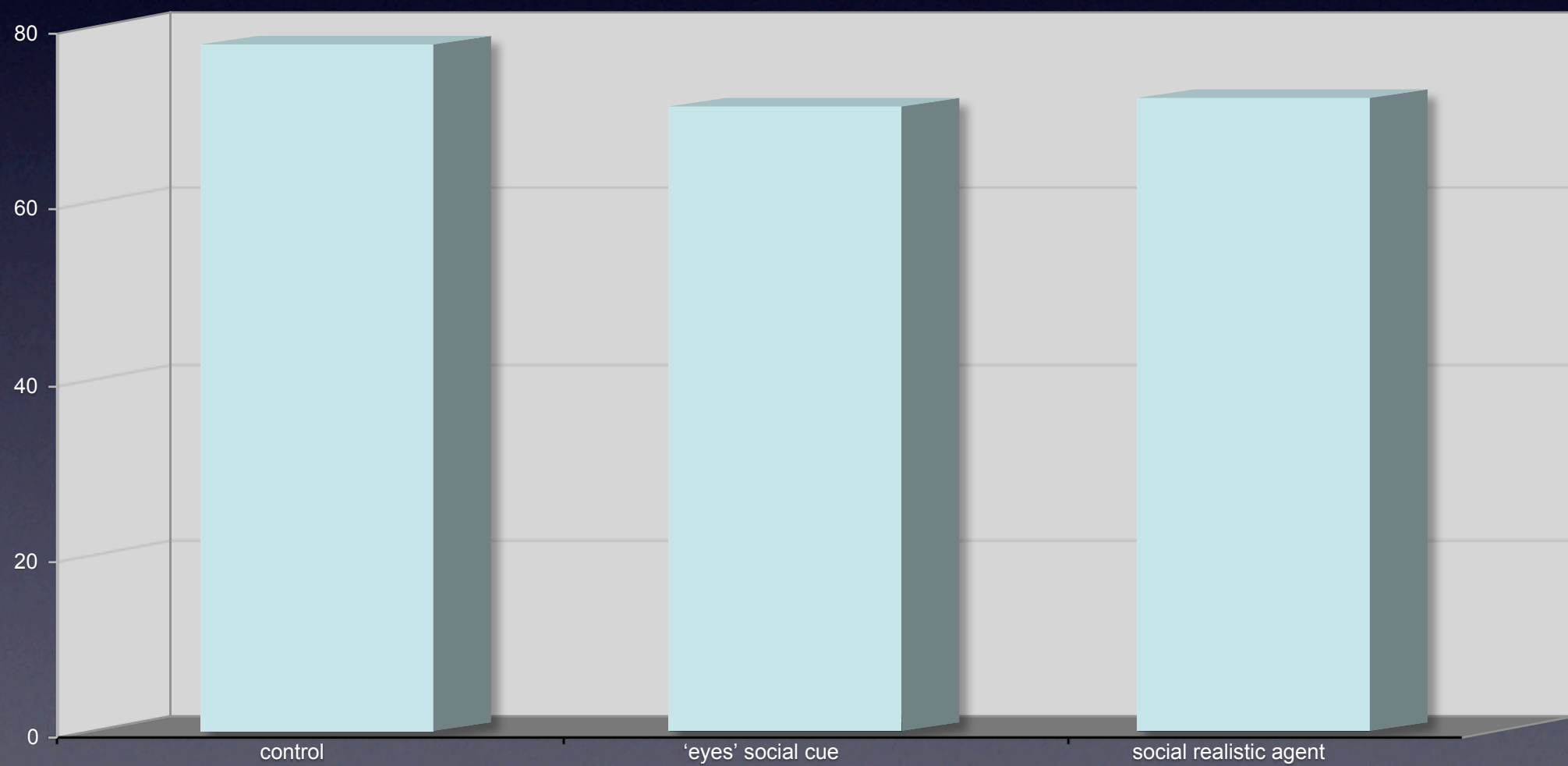


social agent



eyes only
‘you’r being watched!’

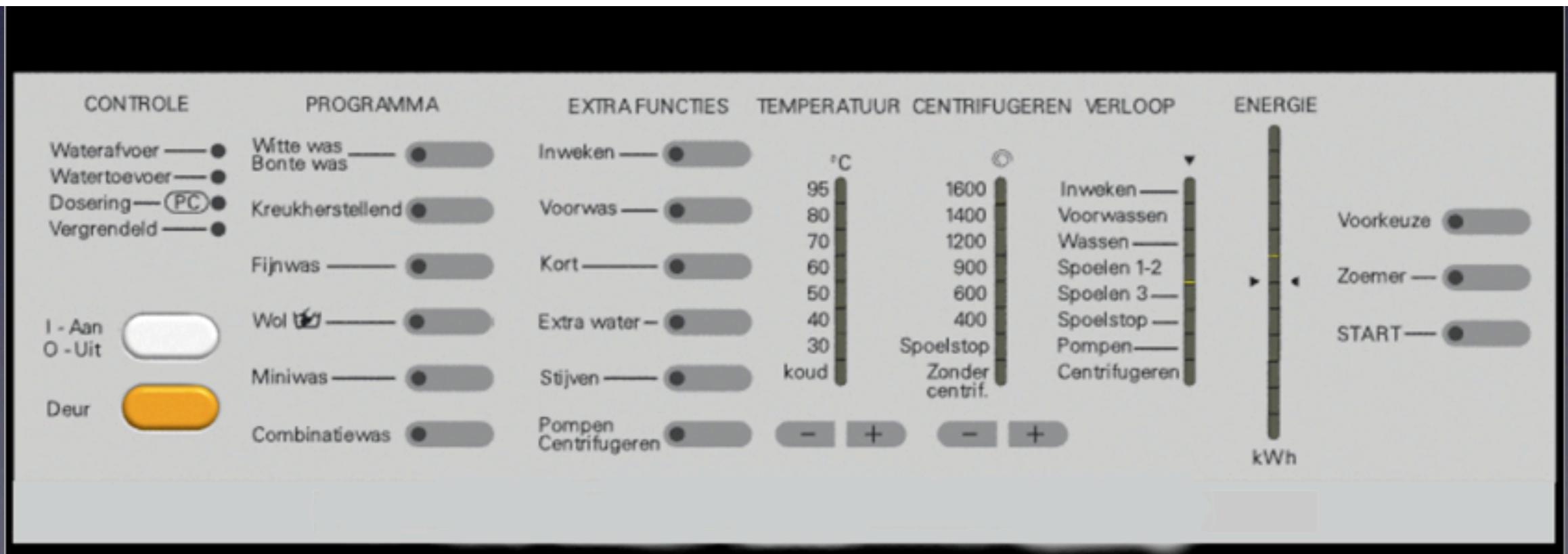
Level of Energy consumption



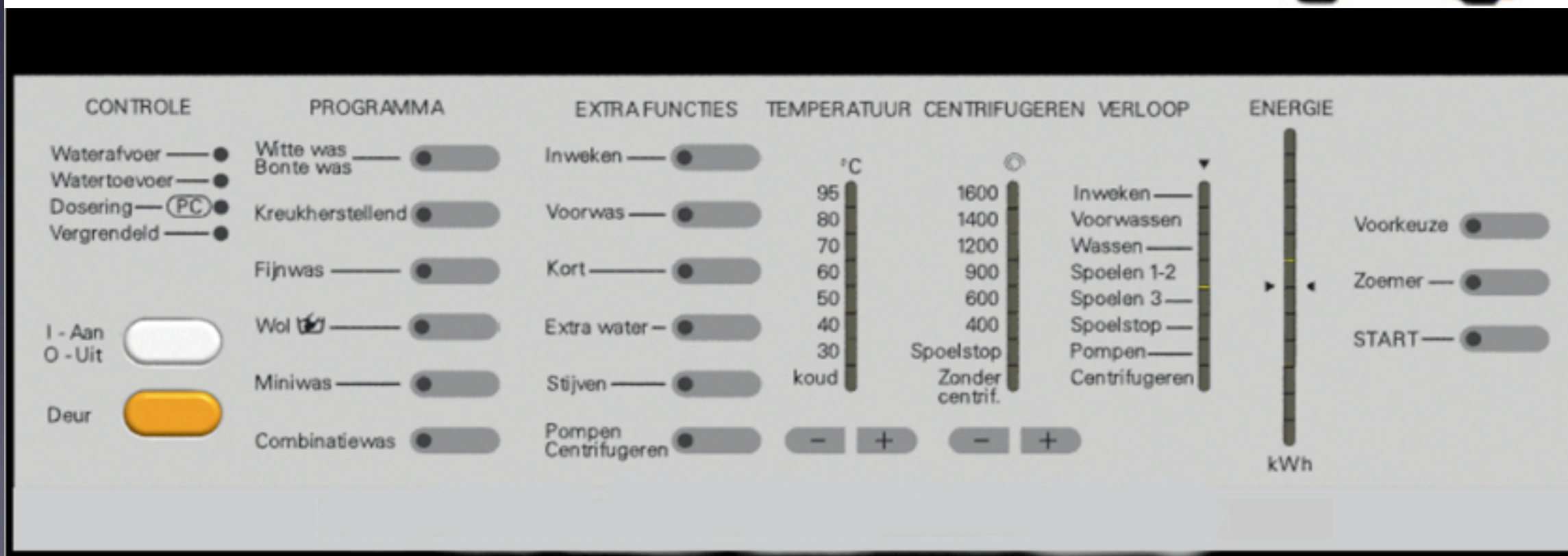
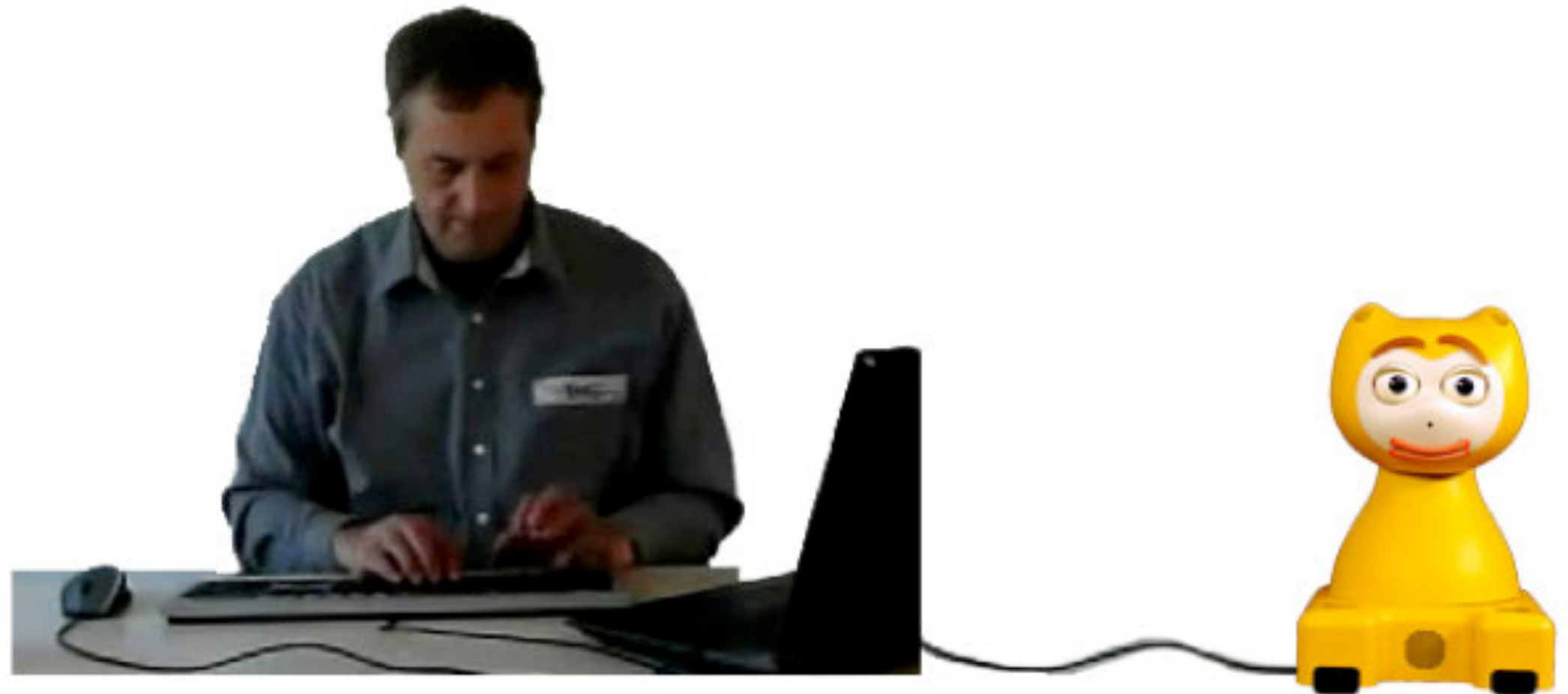
Do people control for limitations of non-human agents?

1. test effect of different levels of agency on behavior through social feedback
2. test whether agency effect is mediated by awareness of agency
3. test effect of feedback by social realistic agent vs non-social agent

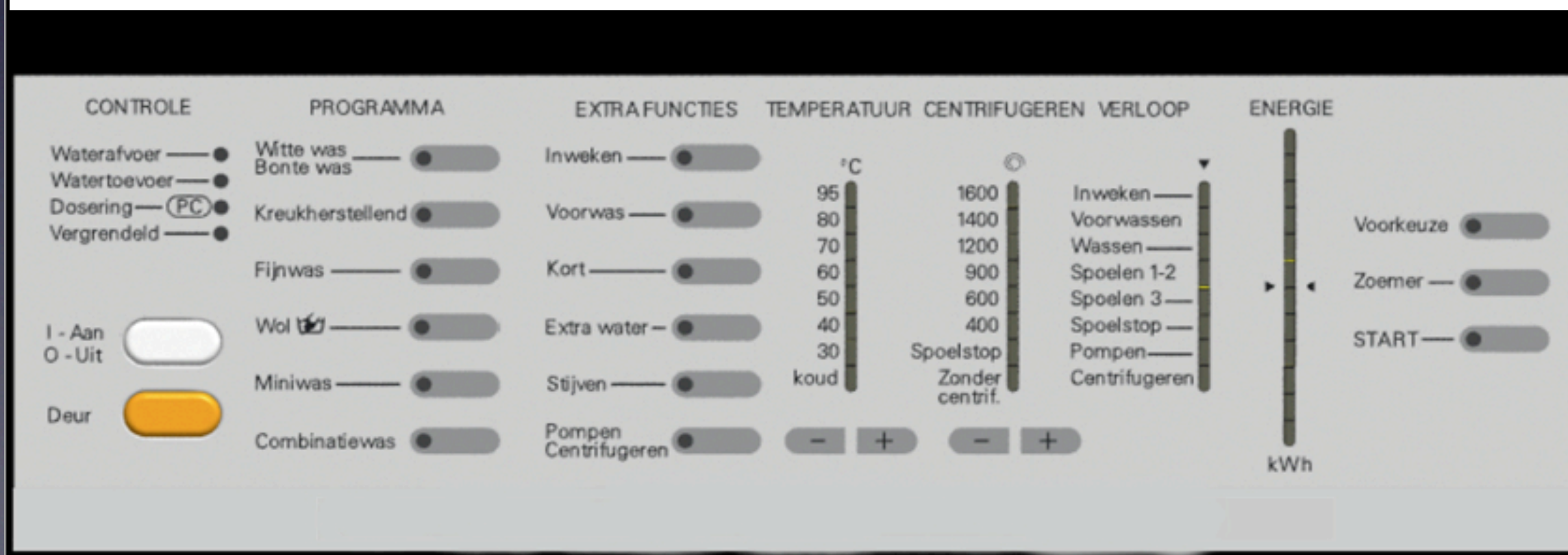
Agent



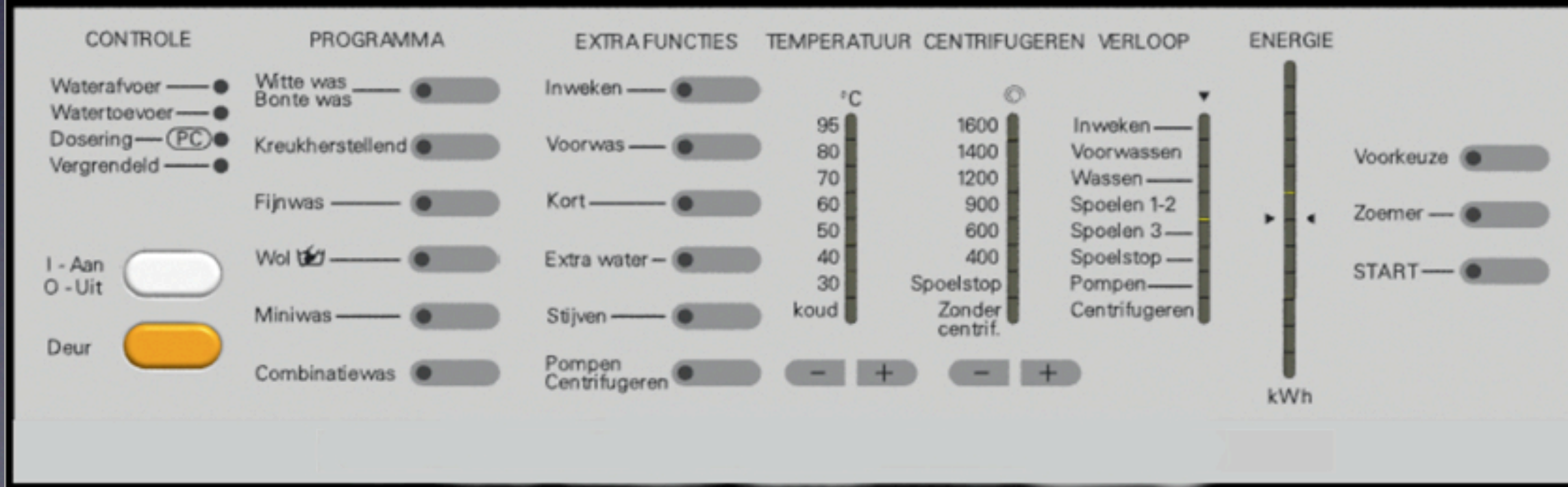
Avatar+ human (high agency)



Random: No agency

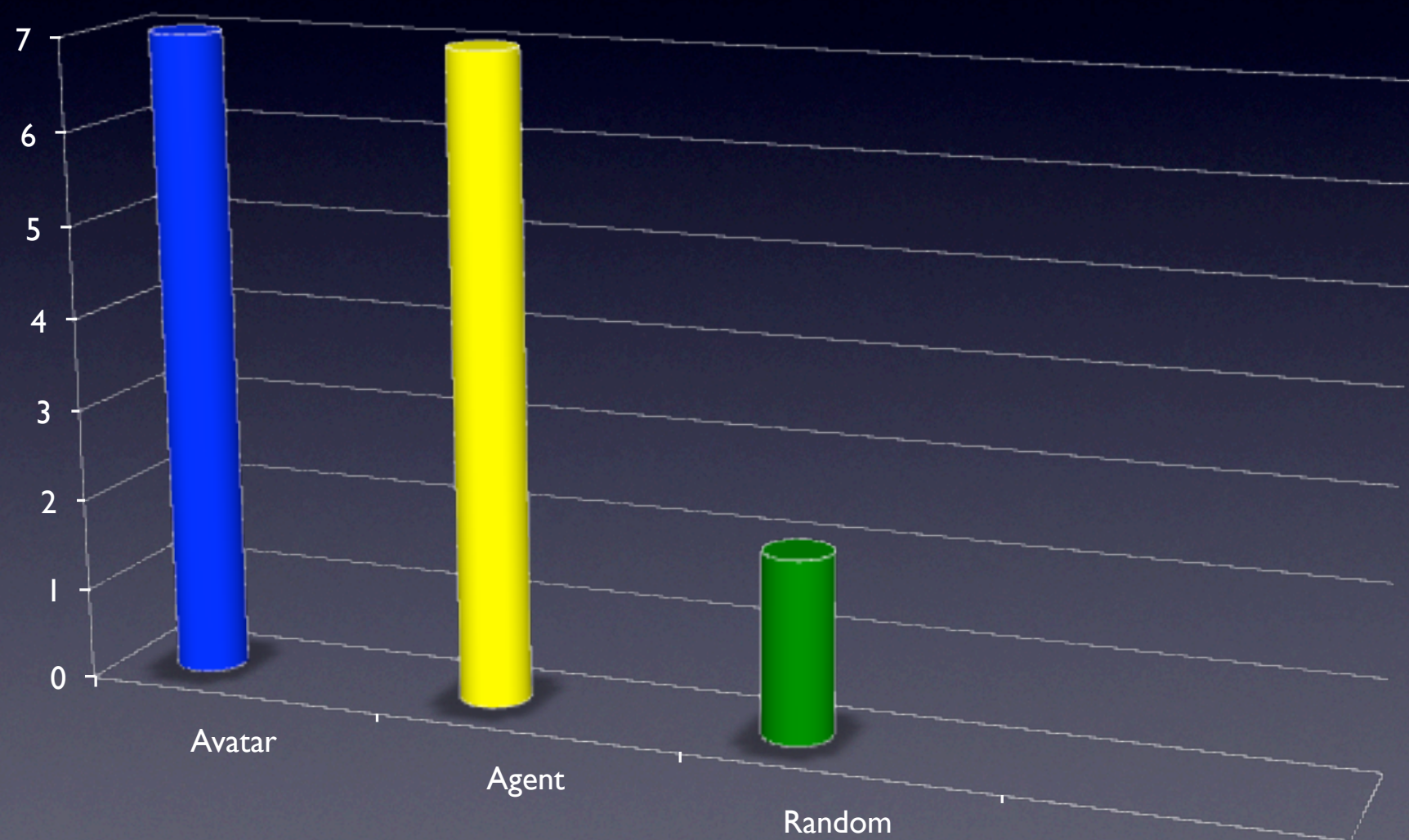


Factual evaluative feedback (no social realism)



Agency judgments

Agency judgments



Energy consumption

