

# Using negative and positive social feedback from a robotic agent to save energy

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### Using Negative and Positive Social Feedback From a Robotic Agent to Save Energy

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In this paper we explore the persuasive effects of social feedback, as provided by a robotic agent, on behavioral change. In a lab setting, two experiments were conducted in which participants had the opportunity to conserve energy while carrying out washing tasks with a simulated washing machine. The experiments tested the effect of positive and negative social feedback and compared these effects to more widely used factual feedback as provided through the simulated user-interface of a washing machine. Results of both studies indicate that social feedback has stronger persuasive effects than factual feedback (Experiment 1). Also in comparison to a factual feedback that also included an evaluative, although non-social, component, social feedback had the strongest persuasive effects (Experiment 2). In addition, an effect of feedback valence was found, demonstrating more conservation actions following negative feedback (social or factual) as compared to positive feedback. Interestingly, negative feedback had especially strong persuasive effects when coming from a social source. These findings have several implications for theory and design of persuasive robotic agents.

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### Persuasive Agents: the Role of Agent Embodiment and Evaluative Feedback

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Social agents can serve as persuasive technology when they give feedback (FB) aimed at reducing household energy consumption. Earlier research indicated that a robotic agent is more effective in stimulating energy conservation behavior than other technical devices (Midden & Ham, 2008). However, it was not clear why this social agent was more effective: the use of speech, agent embodiment and the feedback type were not manipulated independently. In the present study they were. We focused on the role of FB from three different sources: a computer displaying text, a talking computer and a talking social agent. Further, factual FB (FFB, the amount of energy consumed) was compared to evaluative FB (EFB, good or bad performance). Also positive FB was compared to negative FB. An experiment was conducted in which 113 participants used a virtual washing machine. They received interactive FB (either factual or evaluative) about their energy consumption from one of three sources. This FB could be positive or negative, depending on the energy consumption. We measured the change in energy consumption after FB. No main effect of feedback source was found, but the interaction with feedback valence was significant: negative FB from the social agent resulted in a larger decrease in energy consumption than negative FB from the other sources. Further, EFB was more effective than FFB, especially in case of negative feedback. Overall, negative FB resulted in a larger decrease than positive FB.

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