Power Metering:

providing information to reduce home energy use.

Conceptual Models
Spring 2008

Ethan Goldman
Brad Hunt
Holger Kuehnle
Justin Rheinfrank
Benjamin Voss
Josh Weihnacht

We want to talk to people to learn about their home energy consumption.

PIANO COURSE
GREGORY MAGUIRE
What the Dickens

$598
$498
Get it done right.
$598

Energy Monitor

OUTSIDE TEMP 66 °F

ENGINE

BATTERY

ELEC. MOTOR

Consumption

Current 0.0 MPG

Literature

McCalley, L.T. and Midden, C.J.H., Computer Based Systems in Household Appliances:
The Study of Eco-feedback as a tool for Increasing Conservation Behavior.

Darby, S., The Effectiveness of Feedback on Energy Consumption.
A Review for DEFRA of the Literature on Metering, Billing, and Direct Displays.
The Environmental Change Institute, University of Oxford.

Fogg, B.J., Computers as Persuasive Social Actors. In: Persuasive Technology,
Chapter 5, pp. 98-120

Redström, J., Persuasive Design: Fringes and Foundations. In: Persuasive 2006, pp. 112-122

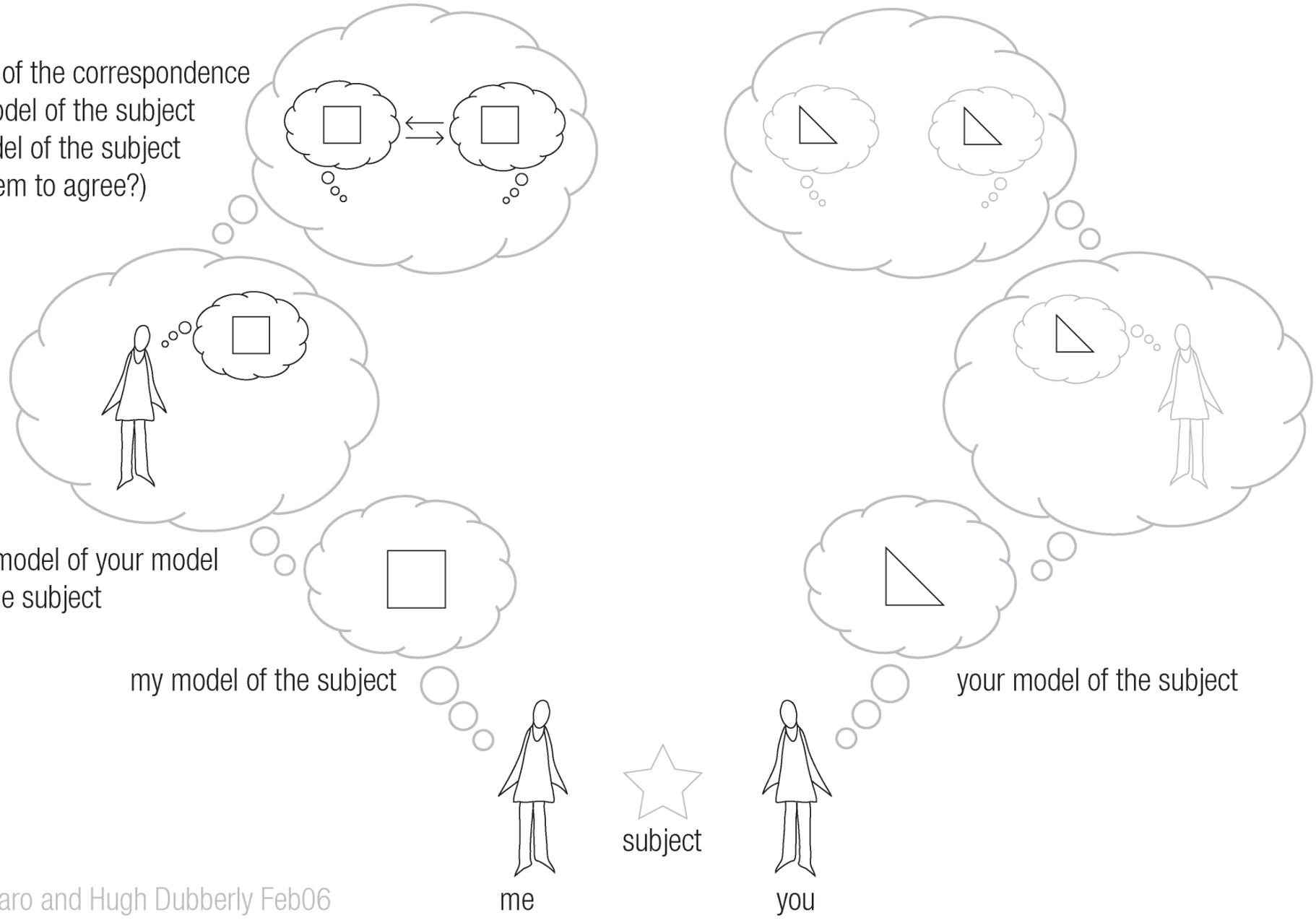
Mankoff, J., et al. Leveraging Social Networks To Motivate Individuals to Reduce
their Ecological Footprints. To be published in HICSS 2007.

Automated Load Classification
H. Scott Matthews, Lucio Soibelman, Mario E. Berges, Ethan J. Goldman, Joshua S. Smith
Multiple appliances are connected to a single circuit.
Example appliances
Radio 1 W
CF light 12 W
Inc. Light 22 W
Fan 38 W
Mini fridge 104 W
Toaster 485 W
Hairdryer 833 W
Microwave 1256 W
A 20-amp outlet is outfitted with a current transformer (CT) and voltage transformer (VT).
The data acquisition board (DAQ) measures the AC signals and a LabView program calculates power, harmonics, etc.
An event detection algorithm locates changes in power, based on the probability distribution of the surrounding time periods.
The classifier uses metrics such as differences in power, reactive power, and harmonics to predict
Appliance 1
Appliance 2
USB DAQ
BOSCH
Invented for life
CenSCIR
Device
Problem

Model of agreement

Human communication relies on agreement

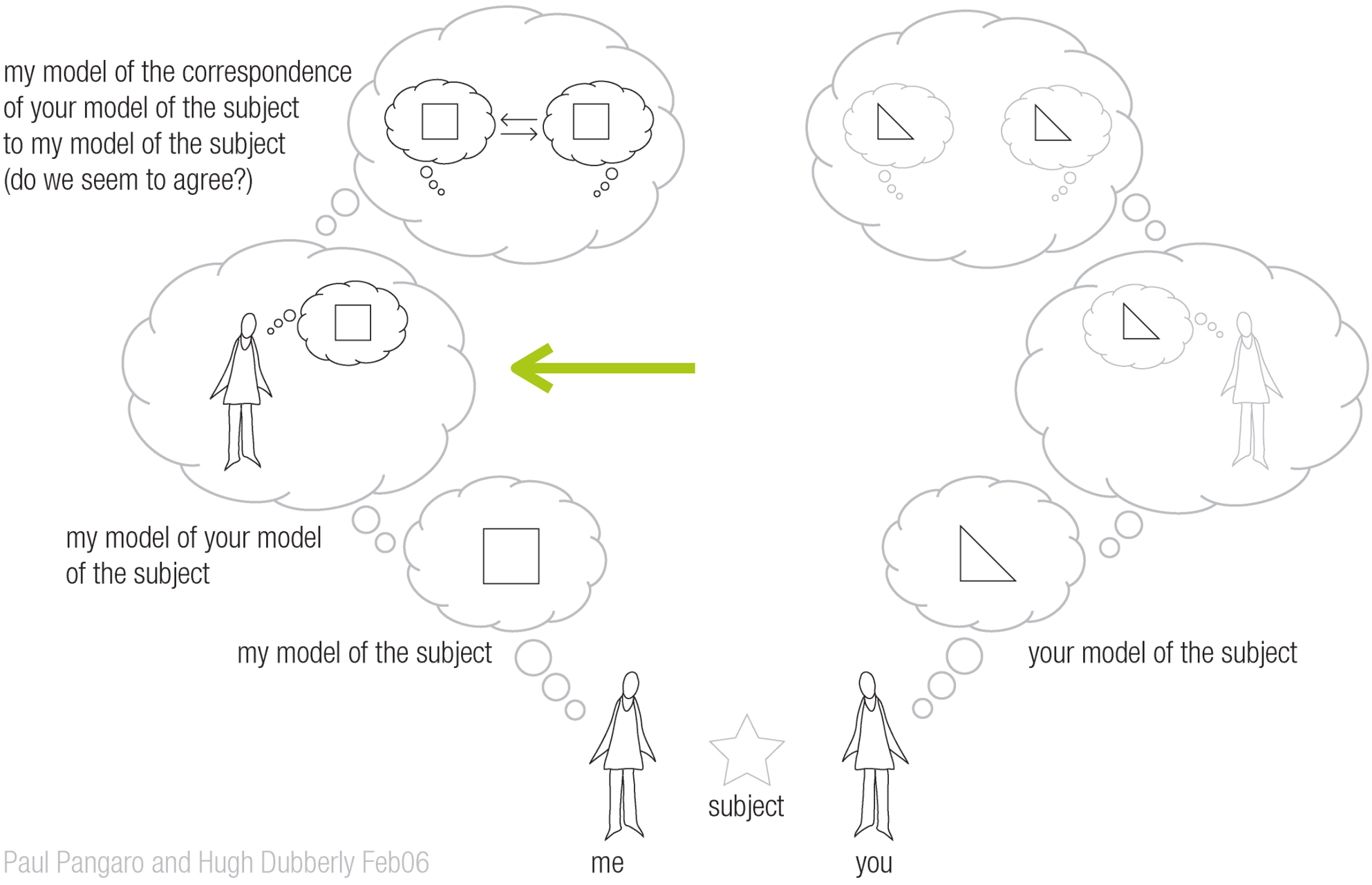
my model of the correspondence
of your model of the subject
to my model of the subject
(do we seem to agree?)



Paul Pangaro and Hugh Dubberly Feb06

Model of agreement

Human communication relies on agreement



Paul Pangaro and Hugh Dubberly Feb06

1011010

1011010

1011010

This uses power

Is it enough for me to care?

Do Nothing

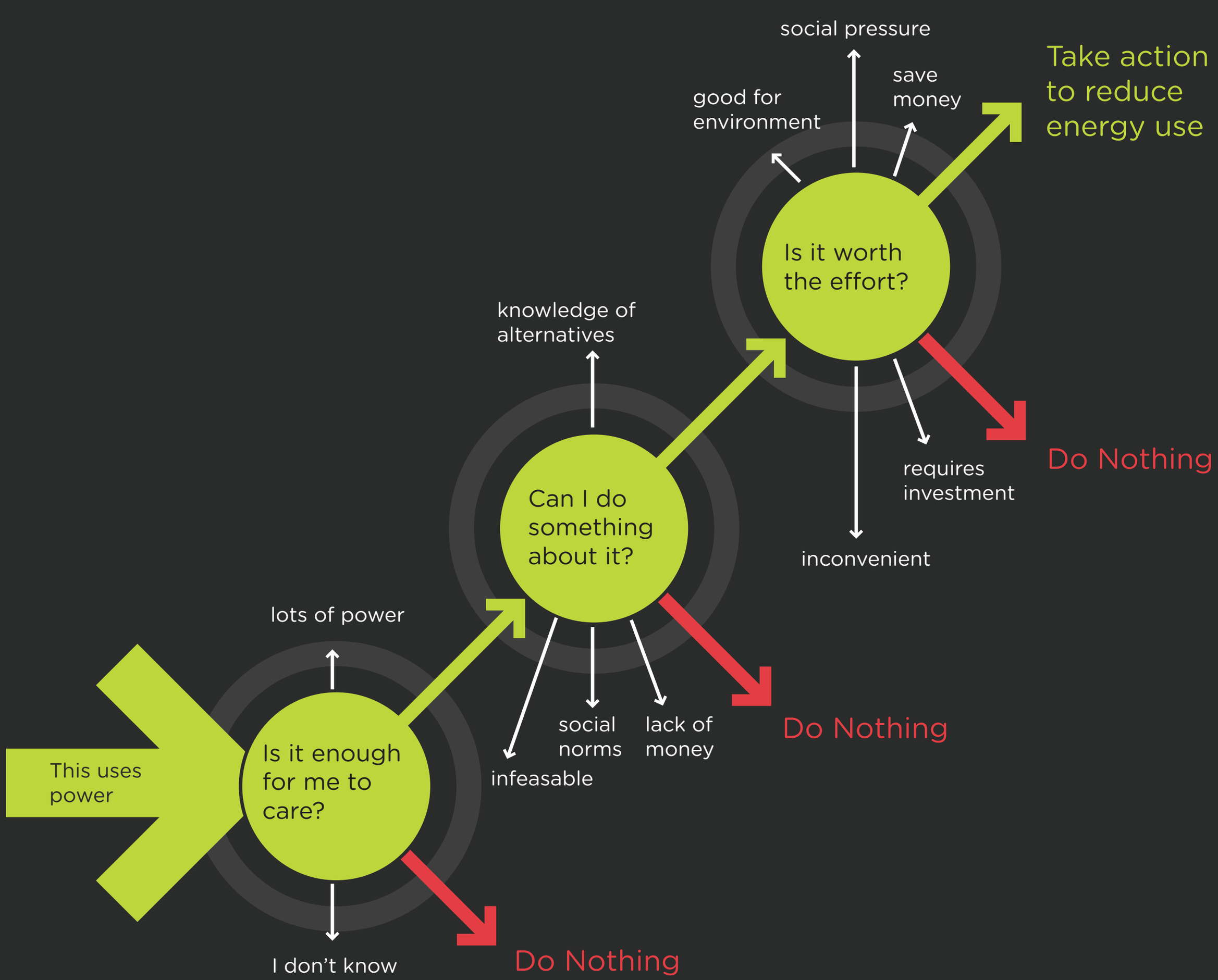
Can I do something about it?

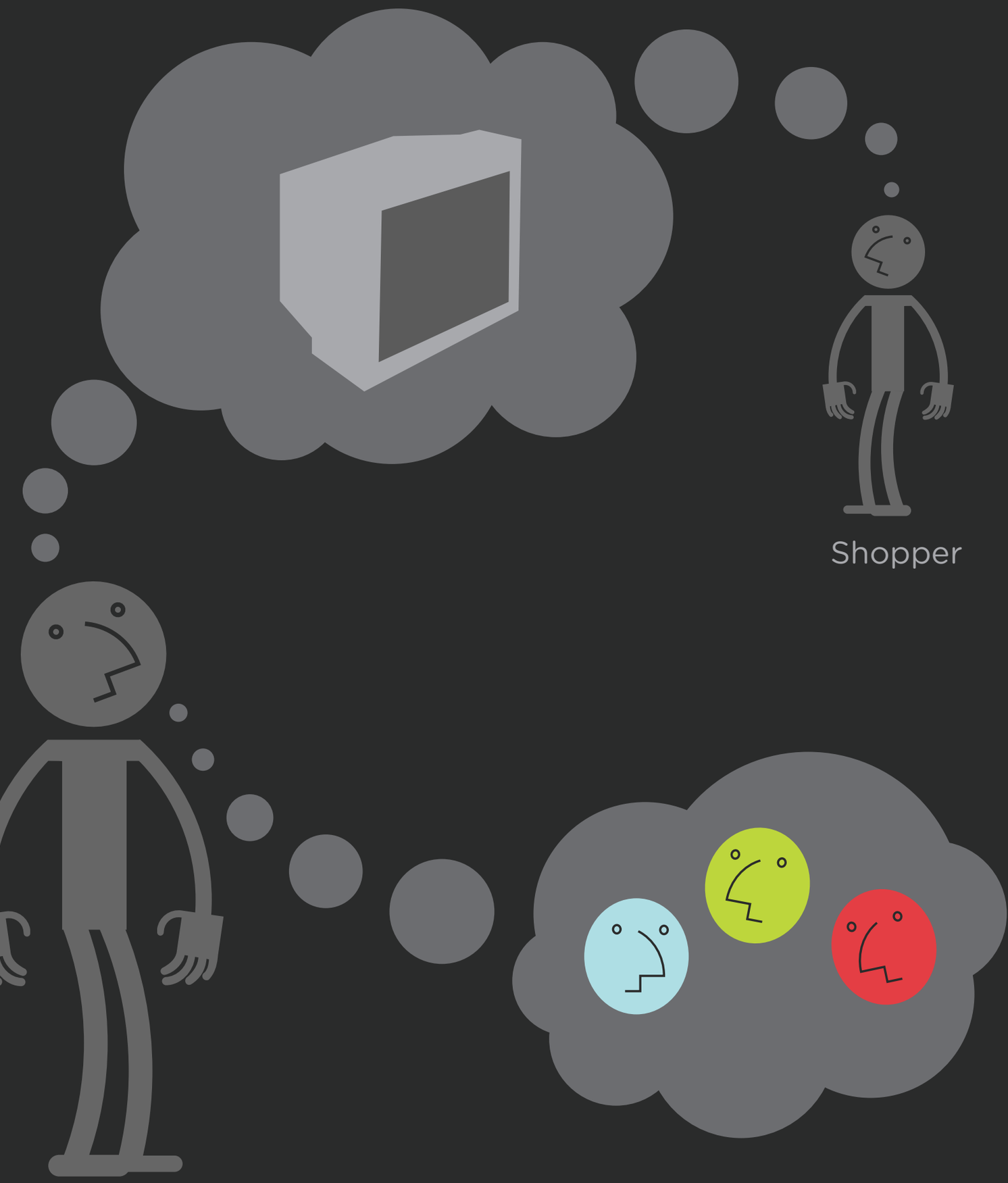
Do Nothing

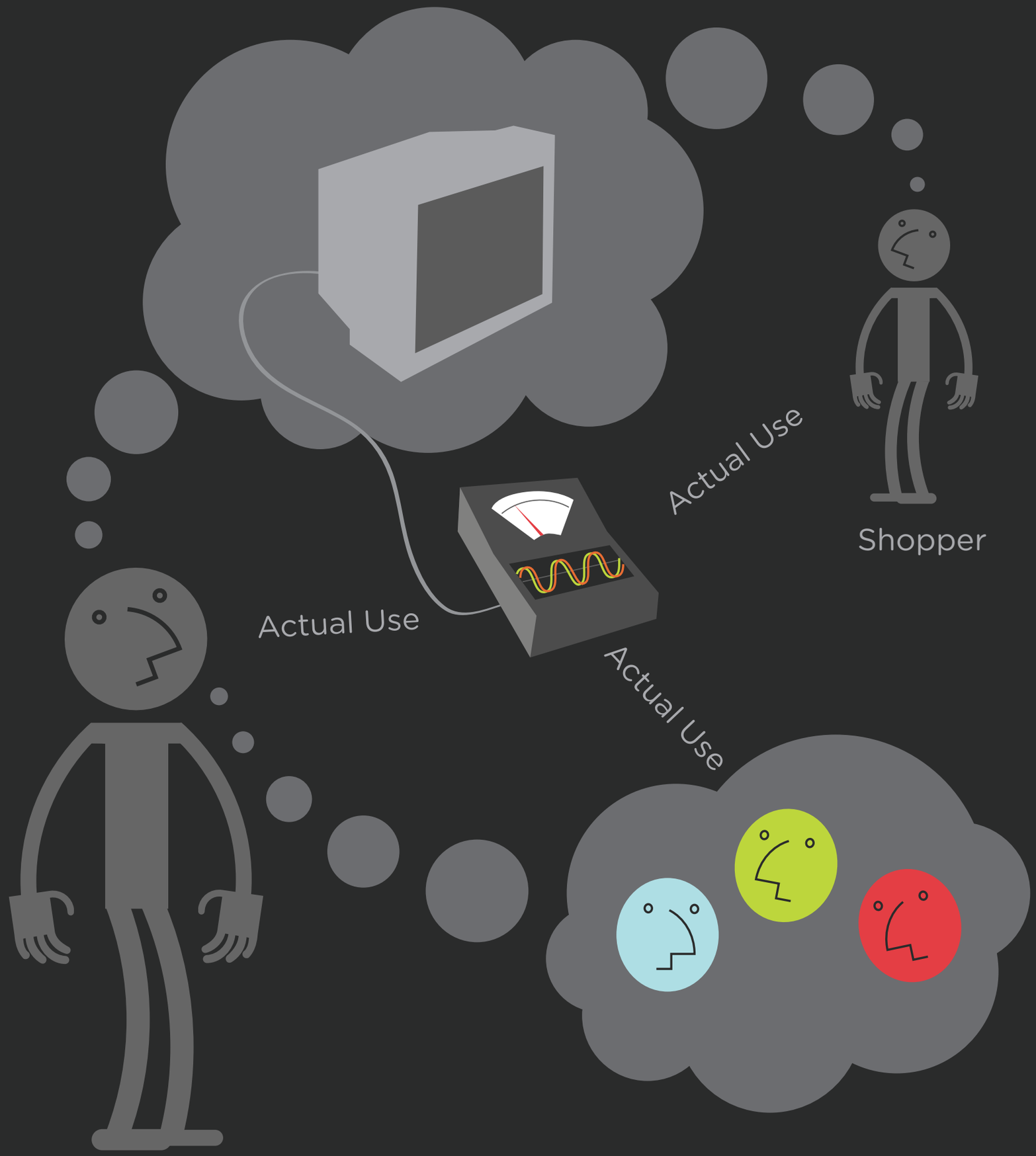
Is it worth the effort?

Take action to reduce energy use

Do Nothing


This uses power
Is it enough for me to care?
lots of power
I don't know
Do Nothing
Can I do something about it?
knowledge of alternatives
infeasable
social norms
lack of money
Do Nothing
Is it worth the effort?
social pressure
good for environment
save money
inconvenient
requires investment
Take action to reduce energy use
Do Nothing


Shopper


Actual Use
Shopper
Actual Use
Actual Use

Power Metering:

providing information to reduce home energy use.