

# Appendix

## Scale of Each Psychological Factor

The following is an explanation on the scales used to measure psychological factors such as attitude, habit, and moral obligation, in the research referred to in this book.

Unless otherwise stated below, these scales have been checked for sufficient credibility (0.7 or more) based on Cronbach’s alpha analysis (Fujii 2002).

Therefore, when conducting research or an experiment measuring these psychological factors, the questions listed here can be considered as one of the most reliable criteria.

- Attitude on car use (bus use / train use) and personal norm

In Fujii and Kitamura (2003), Fujii and Taniguchi (2003), and Fujii et al. (to be published), the following questionnaire was used. The total value (or the average value) of the scales of the first four questions were defined as a scale of attitude, and the total value (or the average value) of the scales of the latter two questions were defined as a scale of the personal norm. Incidentally, for a scale of attitude concerning the bus and train, the same questionnaire was used but with the word “car” changed to “bus” or “train”.

(Attitude)

Is “travelling by car” enjoyable?	Very boring ← Neutral → Very enjoyable □ □ □ □ □ □ □ □
Does “travelling by car” give you a pleasant feeling?	Not pleasant at all ← Neutral → Very pleasant □ □ □ □ □ □ □ □
Do you like “travelling by car”?	Hate it ← Neutral → Love it □ □ □ □ □ □ □ □
Is “travelling by car” comfortable?	Very uncomfortable ← Neutral → Very comfortable □ □ □ □ □ □ □ □

(Personal norm)

Are people around you in favor of you using your car?	Very unfavorable ← Neutral → Very favorable <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Are people around you positive about you using your car?	Very negative ← Neutral → Very positive <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

- Habit

This is a method used in Fujii and Gärling (2003), Fujii and Kitamura (2003), Fujii and Taniguchi (2003), and Fujii et al. (to be published). Similar indices are used by Gärling et al. (2001). The strength of habit of each transportation method is defined by the number of times a participant chooses a particular transportation method from among the choices in the following questionnaire.

These are questions on transportation behavior under a virtual situation.

Please answer them intuitively, not thinking too much, and as quickly as possible.

What mode of transportation do you use when visiting your friend's house?	<input type="checkbox"/> Car	<input type="checkbox"/> Train	<input type="checkbox"/> Bus	
	<input type="checkbox"/> Bike	<input type="checkbox"/> Walking	<input type="checkbox"/> Moto	<input type="checkbox"/> other
What mode of transportation do you use when going clothes shopping?	<input type="checkbox"/> Car	<input type="checkbox"/> Train	<input type="checkbox"/> Bus	
	<input type="checkbox"/> Bike	<input type="checkbox"/> Walking	<input type="checkbox"/> Moto	<input type="checkbox"/> other
What mode of transportation do you use when going to watch a movie?	<input type="checkbox"/> Car	<input type="checkbox"/> Train	<input type="checkbox"/> Bus	
	<input type="checkbox"/> Bike	<input type="checkbox"/> Walking	<input type="checkbox"/> Moto	<input type="checkbox"/> other
What mode of transportation do you use when going out for lunch?	<input type="checkbox"/> Car	<input type="checkbox"/> Train	<input type="checkbox"/> Bus	
	<input type="checkbox"/> Bike	<input type="checkbox"/> Walking	<input type="checkbox"/> Moto	<input type="checkbox"/> other
What mode of transportation do you use when going out for dinner?	<input type="checkbox"/> Car	<input type="checkbox"/> Train	<input type="checkbox"/> Bus	
	<input type="checkbox"/> Bike	<input type="checkbox"/> Walking	<input type="checkbox"/> Moto	<input type="checkbox"/> other
What mode of transportation do you use when going to the beach?	<input type="checkbox"/> Car	<input type="checkbox"/> Train	<input type="checkbox"/> Bus	
	<input type="checkbox"/> Bike	<input type="checkbox"/> Walking	<input type="checkbox"/> Moto	<input type="checkbox"/> other
What mode of transportation do you use when going skiing?	<input type="checkbox"/> Car	<input type="checkbox"/> Train	<input type="checkbox"/> Bus	
	<input type="checkbox"/> Bike	<input type="checkbox"/> Walking	<input type="checkbox"/> Moto	<input type="checkbox"/> other
What mode of transportation do you use when going to a hospital?	<input type="checkbox"/> Car	<input type="checkbox"/> Train	<input type="checkbox"/> Bus	
	<input type="checkbox"/> Bike	<input type="checkbox"/> Walking	<input type="checkbox"/> Moto	<input type="checkbox"/> other
What mode of transportation do you use when going to a convenience store?	<input type="checkbox"/> Car	<input type="checkbox"/> Train	<input type="checkbox"/> Bus	
	<input type="checkbox"/> Bike	<input type="checkbox"/> Walking	<input type="checkbox"/> Moto	<input type="checkbox"/> other
What mode of transportation do you use when going to a book shop?	<input type="checkbox"/> Car	<input type="checkbox"/> Train	<input type="checkbox"/> Bus	
	<input type="checkbox"/> Bike	<input type="checkbox"/> Walking	<input type="checkbox"/> Moto	<input type="checkbox"/> other

- Various psychological factors assumed in the process model for behavioral change toward inhibiting car use

The following are the indices used by Fujii and Taniguchi (2003).

(Awareness of consequences as a preceding factor for moral obligation to inhibit car use)

The following three scales were measured. However, according to the credibility analysis, we could not obtain sufficient credibility between them, so each was used separately for analysis.

- “Do you think that ‘travelling by car’ is not a good behavior?”
- “Do you think that ‘travelling by car’ is not good for the environment?”
- “Do you think that ‘travelling by car’ is not good for society?”  
→ Five-grade scales from “I do not think so at all” to “I strongly think so”

These are scales of psychological factors assumed in Norm Activation Theory.

In this case, we only measured the above awareness of consequences. But in Norm Activation Theory, we can also think of other factors, such as:

- Ascribed responsibility  
 (“Do you think it is each driver’s responsibility to inhibit travelling by car?” or “I think it is one of my responsibilities to inhibit travelling by car”)
- Moral obligation  
 (“Do you think you should inhibit travelling by car?” or “From a moral point of view, do you think it is necessary to inhibit travelling by car?”)

The following are scales of psychological factors assumed in Theory of Planned Behavior, as well as Gollwitzer’s Theory of Implementation Intention.

(Personal norm of inhibiting car use)

We measured the following two scales. However, according to the credibility analysis, we could not obtain sufficient credibility between them, so each was used separately for analysis.

- “Do people around you such as your family agree/disagree to your behavior to ‘inhibit car use’?”  
→ Five-grade scales from “I think they disagree” to “I think they agree”
- “Do people around you such as your family think ‘travelling by car’ is a bad behavior?”  
→ Five-grade scales from “They think it is a good behavior” to “They think it is a bad behavior”

(Perceived behavioral control on inhibiting car use)

We measured the following two scales in five grades from “I do not think so at all” to “I strongly think so”. We then added the two (and multiply by -1) to configure the scale of perceived behavioral control.

- “Do you think it requires a great effort to inhibit car use?”

- “Do you think it is difficult to ‘inhibit car use’?”

(Behavioral intention of inhibiting car use)

We measured the following two scales, and added them to configure the scale.

- “Do you have a feeling of ‘let’s inhibit car use as much as possible’?”  
→ Five-grade scale from “Not at all” to “I have a strong feeling”
- “Do you think ‘let’s inhibit car use as much as possible’?”  
→ Five-grade scale from “I don’t think so at all” to “I strongly think so”

(Decision making commitment of inhibiting car use)

Implementation intention refers to the “strength of intention to implement a behavioral plan that you created”, and in order to measure it accurately, it is necessary to identify each “behavioral plan” created by each person, and to measure how much that person has an intention to implement it. So it is realistically impossible to measure them individually. Thus it is proposed to use a proxy variable of implementation intention to measure the decision making commitment (Rise et al. 2000; Fujii 2005).

Therefore, Fujii and Taniguchi (2003) measured the following two scales, and added them to configure the scale of decision making commitment as a proxy variable of implementation intention.

- “Are you making an effort to ‘inhibit car use as much as possible’?”
- “Do you take some ‘actions to inhibit car use as much as possible’?”  
→ Five-grade scale from “I do not do it at all” to “I do it a lot”

- Various psychological factors in Norm Activation Theory

In Fujii (2000), each of the awareness of consequences, ascribed responsibility, moral obligation, and behavioral intention was configured based on the following questions, by adding up the answers in seven grades from ‘I do not think so at all’ to ‘I strongly think so’.

(Awareness of consequences on transportation behavior in the city center in consideration of the environment)

- I very much like visiting historical and cultural heritage sites in Kyoto.
- Kyoto’s tradition and culture is important.
- At the moment, Kyoto’s tradition and culture is vanishing.
- At the moment, what makes Kyoto uniquely Kyoto (Kyoto’s identity) is vanishing.
- Leaving bikes in the city center of Kyoto deprives Kyoto of its identity.
- Visiting the city center of Kyoto by car deprives Kyoto of its identity.

(Ascribed responsibility on transportation behavior in the city center in consideration of the environment)

- Each person who lives and visits Kyoto has a responsibility to maintain Kyoto’s tradition and culture.
- It is the city or the government rather than citizens who bear the responsibility of maintaining Kyoto’s tradition and culture.

(Moral obligation on transportation behavior in the city center in consideration of the environment)

- Kyoto’s tradition and culture should be maintained in future.
- There should not be a situation in which Kyoto’s identity is lost.
- You should not leave a bike in the city center of Kyoto.
- Leaving bikes in the city center of Kyoto is a behavior that is problematic from a moral point of view.
- You should not visit the city center of Kyoto by car.
- Visiting the city center of Kyoto by car is a behavior that is problematic from a moral point of view.

(Behavioral intention on transportation behavior in the city center in consideration of the environment)

- I don’t leave a bike in the city center of Kyoto.
- I don’t visit the city center of Kyoto by bike.
- When I visit the city center of Kyoto, I use bus or metro.
- I agree to the “regulation of inflow of cars to the city center of Kyoto”.
- I agree to the “regulation of inflow of bikes to the city center of Kyoto”.
- I think I should conduct a behavior that is good for maintaining Kyoto’s traditions and culture, even if it may cause a little inconvenience in my life.

- Environmental awareness

In Fujii et al. (2001, 2003), we measured each of the following questions in nine grades from “I do not think so at all” to “I strongly think so”, and summed all of them to configure a scale of environmental awareness.

In addition, Gärling et al. (2003) also measured environmental awareness using the questionnaire below, but in this analysis, we did not regard environmental awareness as one psychological factor, as in Fujii et al. (2001, 2003) did, but analyzed them by structuring according to Norm Activation Theory.

When doing so, we estimated each psychological factor described in brackets, structured individual scales for each of them, and then analyzed the results.

(Awareness of social consequences)

- I think that environmental pollution has a negative impact on our health, more than we imagine.
- I think that environmental pollution in one country may threaten the health of people around the world.

(Awareness of self-centered consequences)

- I think that laws on environmental protection restrict my freedom.
- I think that environmental protection is not desirable from the point of view of people's employment.

(Awareness of natural consequences)

- I think that harmony with nature is delicate, and it can easily collapse.
- I think that in the next several decades, more than several thousands of species will become extinct.

(Awareness of general consequences)

- I think that I cannot ignore the current issues concerning the environment.
- I do not think so much about environmental issues.

(Ascribed responsibility)

- I think that all members of society should have responsibility for the environment.
- I think that it is important that each person cares about the environment.
- I think that the government or nation should bear responsibility for the environment, and not the general public.

(Moral obligation)

- I feel that I should care about environmental issues as a moral duty.
- I feel that I should care about environmental issues in daily life.

In Fujii and Taniguchi (2003) and Fujii (2003), in order to simply measure the degree of environmental awareness, we extracted the following four questions from the above list of questions in order to configure the scale of environmental awareness. For each of the following questions, we measured them in five grades from "I do not think so at all" to "I strongly think so", and summed them up.

- Do you think that you should care about environmental issues?
- Do you care about environmental issues in your daily life?
- Do you think it is necessary that each person cares about the environment?
- Do you think that you cannot ignore the current issues concerning the environment?

- Social value orientation

We requested people to intuitively answer the following nine questions.

Each question consists of the following three: "a choice that your portion is the maximum", "a choice that the sum of both parties' portion is the maximum", and "a choice that the difference between the parties is the maximum".

Then, we counted the number of times participants chose each choice.

Next, we defined an individual as proself if they selected six or more choices that "your portion is the maximum", or six or more choices that "the difference between

the parties is the maximum". We defined an individual as prosocial if they selected six or more choices that "the sum of both parties' portion is the maximum".

When it was not possible to categorize by using this definition, we regarded that measurement by this test had failed, and did not assign the participant to either category. In examples introduced in this book, Eek et al. (2002) used this method.

Assume the following nine cases (choices) that decide the portions allocated to two people.

Please select one choice intuitively, and circle either of A, B, or C.

(Choice 1)

- A. Your portion is 480 and the counterpart's portion is 80.
- B. Your portion is 540 and the counterpart's portion is 280.
- C. Your portion is 480 and the counterpart's portion is 480.

(Choice 2)

- A. Your portion is 600 and the counterpart's portion is 340.
- B. Your portion is 540 and the counterpart's portion is 540.
- C. Your portion is 540 and the counterpart's portion is 140.

(Choice 3)

- A. Your portion is 520 and the counterpart's portion is 520.
- B. Your portion is 520 and the counterpart's portion is 120.
- C. Your portion is 580 and the counterpart's portion is 320.

(Choice 4)

- A. Your portion is 490 and the counterpart's portion is 90.
- B. Your portion is 550 and the counterpart's portion is 290.
- C. Your portion is 490 and the counterpart's portion is 490.

(Choice 5)

- A. Your portion is 530 and the counterpart's portion is 270.
- B. Your portion is 470 and the counterpart's portion is 470.
- C. Your portion is 470 and the counterpart's portion is 70.

(Choice 6)

- A. Your portion is 500 and the counterpart's portion is 500.
- B. Your portion is 500 and the counterpart's portion is 100.
- C. Your portion is 560 and the counterpart's portion is 300.

(Choice 7)

- A. Your portion is 510 and the counterpart's portion is 510.
- B. Your portion is 570 and the counterpart's portion is 310.
- C. Your portion is 510 and the counterpart's portion is 110.

(Choice 8)

- A. Your portion is 520 and the counterpart's portion is 260.
- B. Your portion is 460 and the counterpart's portion is 60.
- C. Your portion is 460 and the counterpart's portion is 460.

(Choice 9)

- A. Your portion is 530 and the counterpart's portion is 130.
- B. Your portion is 530 and the counterpart's portion is 530.
- C. Your portion is 590 and the counterpart's portion is 330.

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