The Perceived Danger (PD) Scale

Instructions for Administration and Scoring

The perceived danger (PD) scale is a validated psychometric tool designed to measure the perceived danger of robots, with perceived danger defined as the anticipation of harmful consequences of the actual or imagined interaction with another entity.

Scale Structure

The PD scale is a 12-item bifactor scale with four dimensions – affective states, physical vulnerability, ominousness, and cognitive readiness – that consist of three items each. The scale consists of the following items, separated by subdimension:

Affective States:

How nervous would you feel?

How anxious would you feel?

How stressed would you feel?

Physical Vulnerability:

How exposed to physical injury would you be?

How likely was the robot to cause pain?

How severely might you be injured?

Ominousness:

How menacing was the robot?

How threatening was the robot?

How intimidating was the robot?

Cognitive Readiness:

How alert would you be?

How vigilant would you be?

How cautious would you be?

Instructions for Administration

The bifactor nature of the scale allows for flexible usage depending on study needs; the entire scale may be administered to measure overall perceptions of danger, or each dimension may be administered as a subscale on its own to measure more specific aspects of perceived danger.

Each item is to be evaluated on a 6-point Likert scale ranging from "not at all" to "extremely." For virtual administration, the prompt ahead of the items is "Answer as if you were the person in the video…." For in-person administration, the prompt ahead of the items is "During your time with the robot…." Note that both the prompt and the verb tense of the items may be modified as needed to fit the conditions of a study.

Instructions for Scoring

The PD scale is scored by averaging the item ratings together. Scores will range from 1 to 6, with 1 representing the least perceived danger and 6 representing the most perceived danger. To obtain a total PD score, the ratings of all 12 items are averaged. A score for each subdimension may also be obtained by averaging the three item ratings from a given subscale. Therefore, if the entire

scale is administered, five total scores may be calculated: the total PD score, the affective states score, the physical vulnerability score, the ominousness score, and the cognitive readiness score.

See the attached pages for blank versions of the scale for both virtual and in-person scenarios. Necessary changes have been made to verb tense of some items for the in-person version of the scale. Items are ordered so that one item from each subscale appears every four items to avoid clustering of subdimensions. Item order may be randomized as needed for practical applications of the scale.

Virtual Administration

Answer as if you were the person in the video…

	Not at all					**Extremely**
	1	**2**	**3**	**4**	**5**	**6**
How nervous would you feel?	○	○	○	○	○	○
How exposed to physical injury would you be?	○	○	○	○	○	○
How menacing was the robot?	○	○	○	○	○	○
How alert would you be?	○	○	○	○	○	○
How anxious would you feel?	○	○	○	○	○	○
How likely was the robot to cause pain?	○	○	○	○	○	○
How threatening was the robot?	○	○	○	○	○	○
How vigilant would you be?	○	○	○	○	○	○
How stressed would you feel?	○	○	○	○	○	○
How severely might you be injured?	○	○	○	○	○	○
How intimidating was the robot?	○	○	○	○	○	○
How cautious would you be?	○	○	○	○	○	○

In-Person Administration

During your time with the robot…

	Not at all					**Extremely**
	1	**2**	**3**	**4**	**5**	**6**
How nervous did you feel?	○	○	○	○	○	○
How exposed to physical injury were you?	○	○	○	○	○	○
How menacing was the robot?	○	○	○	○	○	○
How alert were you?	○	○	○	○	○	○
How anxious did you feel?	○	○	○	○	○	○
How likely was the robot to cause pain?	○	○	○	○	○	○
How threatening was the robot?	○	○	○	○	○	○
How vigilant were you?	○	○	○	○	○	○
How stressed did you feel?	○	○	○	○	○	○
How severely might you have been injured?	○	○	○	○	○	○
How intimidating was the robot?	○	○	○	○	○	○
How cautious were you?	○	○	○	○	○	○