

Cultural Differences in Attitudes Towards Robots

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Abstract

This study presents the result of a cross-cultural study of negative attitude towards robots. A questionnaire was presented to Dutch, Chinese, German, Mexican, American (USA) and Japanese participants based on the Negative Attitude towards Robots Scale (NARS). The American participants were least negative towards robots, while the Mexican were most negative. Against our expectation, the Japanese participants did not have a particularly positive attitude towards robots.

1 Introduction

The United Nations (UN), in a recent robotics survey, identified personal service robots as having the highest expected growth rate (UN, 2002). These robots help the elderly (Hirsch et al., 2000), support humans in the house (NEC, 2001), improve communication between distant partners (Gemperle, DiSalvo, Forlizzi, & Yonkers, 2003) and are research vehicles for the study on human-robot communication (Breazeal, 2003; Okada, 2001). A survey of relevant characters is available (Bartneck, 2002; Fong, Nourbakhsh, & Dautenhahn, 2003).

It appears that different cultures have a different exposure to robots through media or through personal experience. The number of humanoids robots, toy robots, games and TV shows give Japan the leading role in robotic development and culture. However, the typical "robots will take over the world" scenario that is so often used in western culture (Cameron, 1984; Wachowski & Wachowski,

2003) is less present in Japan. Yamamoto (1983) hypothesized that Confucianism might have had an influence on the positive development of robot culture in Japan. In the popular Japanese Manga movies good fights evil just like in the western world, but the role of the good and the evil is not mapped directly to humans as being the good against robots being the evil. In these movies the good and the evil are distributed. You might have a good robot that fights an evil human villain or a good robot fighting bad robots.

If we are to employ more and more robots in daily life it appears necessary to study what attitude the users have towards robots, which of course depend on culture.

Computer anxiety prevents users from using computers and educational psychologists have studied its effects in great detail (Raub, 1981). However, the effects of robot anxiety are still largely unknown. With an increasing number of robots, robot anxiety

might become as important as computer anxiety is today.

2 Method

We therefore conducted a cross-cultural study that investigated the attitude towards robots. We presented 28 Dutch, 20 Chinese (living in the Netherlands), 69 German, 16 Mexican, 22 American (USA) and 53 Japanese participants a questionnaire based on the Negative Attitude towards Robots Scale (NARS). The original Japanese questionnaire was first translated to English and then to all other languages using the forth and back translation process.

Most of the participants were university students. The validity of the questionnaire has been previously assessed (Nomura, Kanda, & Suzuki, 2004). The questionnaire consisted of 14 items (5-point-scales) in three constructs:

1. attitude towards the interaction with robots (*interact*)
(e.g. I would feel relaxed talking with robots)
2. attitude towards social influence of robots (*social*)
(e.g. I am concerned that robots would have a bad influence on children)
3. attitude towards emotions in interaction with robots (*emotion*)
(e.g. I would feel uneasy if robots really had emotions)

In the following text we will use the *italic style* to highlight the dependent variables.

3 Results

Table 1 presents the means and standard deviations of all measurements for all nationalities. An analysis of Covariance (ANCOVA) was performed in which nationality and gender were the independent variables. *Interact*, *social* and *emotion* were the dependent variables and age the covariant. Gender had no significant influence on the measurements. Nationality had a significant influence on *interact* ($F(5)=38.775$, $p<.001$), *social* ($F(5)=6.954$, $p<.001$) and *emotion* ($F(5)=5.004$, $p<.001$). Age had a significant ($F(1)=7.998$, $p=.005$) influence on *emotion*. Figure 1 presents the means of all conditions.

The Japanese participants ($m=2.05$) rated *interact* significantly ($t(73)=3.857$ $p<.001$) more negative than participants from the USA ($m=1.49$). Furthermore, Mexican participants ($m=4.27$) rated *interact* significantly ($t(79)=10.283$, $p<.001$) more negative than German participants ($m=2.23$). There was no

significant difference in *interact* between German, Dutch, Chinese and Japanese participants.

		Mean	Std.Dev.
<i>interact</i>	CHN	2.22	0.55
	DEU	2.24	0.73
	JPN	2.05	0.61
	MEX	4.27	0.72
	NLD	2.10	0.68
	USA	1.45	0.50
<i>social</i>	CHN	2.71	0.62
	DEU	3.21	0.87
	JPN	3.17	0.69
	MEX	3.48	0.92
	NLD	2.69	0.60
	USA	2.40	0.79
<i>emotion</i>	CHN	2.77	0.88
	DEU	3.53	0.91
	JPN	3.06	0.79
	MEX	3.46	0.79
	NLD	2.99	0.96
	USA	2.62	0.72

Table 1: Mean and standard deviation of all measurements for all nationalities

For *social*, we could identify two groups that had no significant difference within them, but were significantly different from the other group. The group of German, Mexican and Japanese participants rated *social* significantly higher ($t(73)=3.807$, $p<.001$) than the group of Chinese, Dutch and American participants.

We found three groups of nationalities in the *emotion* measurement that were not significantly different within themselves, but different compared to the other groups. German ($m=3.51$) and Mexican participants rated *emotion* significantly ($t(116)=2.755$, $p=.007$) higher than Japanese ($m=3.08$) participants. The later rated *emotion* significantly ($t(73)=2.176$, $p=.033$) higher than American participants.

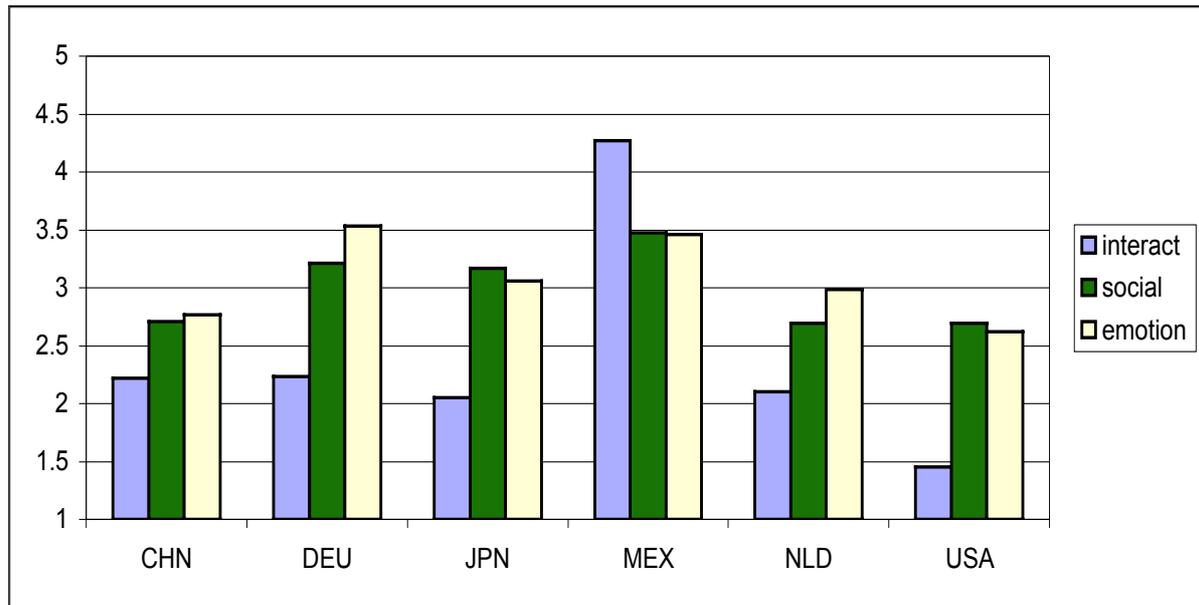


Figure 1: Means for all nationalities.

3 Conclusions

In contradiction to the popular believe that Japanese love robots our results show that the Japanese are concerned with the impact that robots might have on society. A possible explanation could be that through the high exposure to robots, the Japanese are more aware of robots abilities and also their lack of abilities.

Participants from the USA were least negative towards robots, in particular on the aspect of interacting with them. A possible reason could be that they are used to technology and at the same time easy going when it comes to talking to new people. Another striking difference can be found when looking at the ratings of the Mexican participants. They were most negative towards robots, in particular towards interacting with them. This is surprising, since they are a neighbor state of the USA which were least concerned.

The prior experience that the participants had with robots, such as a personal interaction with a robot, was not assessed by the NARS questionnaire. This experience might have an influence on the results and we are currently preparing to administer the questionnaire to owners of the Sony's robotic dog Aibo. In addition, we are planning to conduct the experiment in other eastern and western countries.

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