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SHORT-PAPER

The Awareness Attribution Scale: An Italian Validation Study

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The Awareness Attribution Scale: An Italian Validation Study

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ABSTRACT

Understanding how people attribute awareness to robots is essential for developing socially and ethically aligned Human-Robot Interactions (HRI). This study presents the Italian validation of the Awareness Attribution Scale (AAS), an existing psychometric instrument designed to measure the attribution of awareness to artificial agents. The adaptation procedures (forward translation, native-speaker review, back-translation, and testing) were performed with the AAS. The final translated version was administered to Italian participants (N = 200) to rate different entities on perceived awareness. Analyses demonstrated good internal reliability of the Italian scale and expected attribution patterns across entities. These results provide evidence that the Italian AAS behaves consistently with the original English version, supporting its use in future cross-cultural research on awareness attribution. Furthermore, these findings advance cross-cultural knowledge of awareness attribution, a fundamental component of more inclusive settings.

CCS CONCEPTS

• Human-centered computing → Human computer interaction (HCI)

KEYWORDS

Human-Robot Interaction, Awareness Attribution, Cross-Cultural Validation, Psychometric Scale, Perceived Awareness

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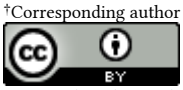

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1 Introduction

Attributing awareness to artificial agents, like robots, is a significant aspect of Human-Robot Interaction (HRI) because it may mediate social behavior towards these [1, 2]. If people believe that a robot is aware or capable of subjective experience, they may have different expectations and beliefs about it [3, 4]. Culture shapes attitudes and perceptions and can therefore impact trust, comfort with, and behavior towards robots, especially social ones [5, 6, 7]. For this reason, it is fundamental to measure and understand how people attribute awareness to artificial agents, and to what extent these attributions differ across cultures to design more aligned and culturally sensitive systems [8].

The Awareness Attribution Scale (AAS) [9] is a new psychometric scale that measures the extent to which people attribute awareness to various kinds of entities, including robots. To make the AAS more widely applicable and comparable across languages and cultures, it is necessary to translate and adapt it to other languages, following a standard translation methodology.

This article presents the Italian validation of the AAS, which involved a translation and adaptation process, as well as data collection and analysis. The translation and adaptation process followed the steps of forward translation, native review, back-translation, and testing [10, 11]. For the testing phase, data collection and analysis followed the same methodology as the original English validation study of the AAS (Study 3) [9]. Italian participants were asked to rate four entities (a rock, a dog, a humanoid robot, and a human) on perceived awareness using the Italian version of the scale. This translated replication allowed for a direct comparison with the original validation and tested whether the Italian AAS could meaningfully differentiate between entities that vary in their perceived level of awareness.

This validation study is a necessary step for making the measure of attributed awareness applicable and comparable across languages and cultures. By allowing such comparisons, this work can help build a more empirically grounded understanding of human perception of artificial agents.

2 Method

The translation of the scale from English to Italian followed the main stages recommended for the translation of self-report

instruments [10, 11]. First, a preliminary Italian translation of the AAS was produced using an automated translation tool to have an initial rendering of the English items. This draft was then reviewed independently by two native Italian speakers with advanced English proficiency. One of the reviewers was aware of the concepts being examined and the other one was uninformed. Both reviewers evaluated the translated items for linguistic accuracy, idiomatic fluency, and conceptual equivalence with the source version. Their comments were compared and synthesized into a single reconciled Italian draft.

A back translation was performed on this Italian draft. A bilingual translator, who was blind to the original English scale, translated the entire scale back to English. The back-translated items were compared to the original English scale on an item-by-item basis to detect possible ambiguities and/or semantic differences.

The comparison revealed a minor discrepancy in Item 7 ("knows that it has its own identity"), which was back-translated as "knows to have its own identity." Because this difference reflected an artefact of the back-translator's phrasing rather than a conceptual change in the Italian version, the Italian item was retained without modification.

However, Item 8 ("can understand why it has its own identity"), which was initially translated into Italian as "può comprendere perché ha una propria identità," and back-translated to English as "can understand because it has its own identity," showed an ambiguity due to the Italian word "perché," which can mean both "why" and "because." To remove potential confusion, this item was rephrased as "può comprendere per quale motivo ha una propria identità" (literal English translation: "can understand for what reason it has its own identity") providing an unambiguous interpretation.

After that, an expert consultation phase was conducted. The aim was to ensure semantic, idiomatic, experiential, and conceptual equivalence between the English and Italian versions. Each item was discussed to verify that the Italian phrasing accurately captured the intended psychological meaning without introducing cultural bias or linguistic ambiguity.

This process produced the Italian version of the AAS that was ready for the validation study.

Original English version:

Q01 - can have intense experiences
Q02 - can perceive differently based on life experiences
Q03 - can think about an idea
Q04 - can understand different information to create a unified experience
Q05 - can evolve while maintaining the same identity
Q06 - has its own identity
Q07 - knows that it has its own identity
Q08 - can understand why it has its own identity
Q09 - can plan actions to achieve desired results
Q10 - has mind processes similar to the ones happening in a brain
Q11 - can think about its thoughts and experiences
Q12 - can think about what it did in the past
Q13 - can experience optical illusions or other perception illusions
Q14 - can know where it is

Translated Italian version:

Q01 - può avere esperienze intense
Q02 - può percepire in modo diverso in base alle esperienze di vita
Q03 - può pensare a un'idea
Q04 - può comprendere informazioni diverse per creare un'esperienza unificata
Q05 - può evolversi mantenendo la stessa identità
Q06 - ha una propria identità
Q07 - sa di avere una propria identità
Q08 - può comprendere per quale motivo ha una propria identità
Q09 - può pianificare azioni per raggiungere i risultati desiderati
Q10 - ha processi mentali simili a quelli che avvengono in un cervello
Q11 - può pensare ai propri pensieri ed esperienze
Q12 - può pensare a ciò che ha fatto in passato
Q13 - può vivere illusioni ottiche o altre illusioni percettive
Q14 - può sapere dove si trova

The aim of the validation study was to test the Italian version of the AAS on Italian speakers to check the linguistic intelligibility and psychometric properties of the scale. Participants were recruited from Prolific and received £2 for 8 minutes of their time. The study was run online using Qualtrics following the same procedure as the original validation study [9].

Upon informed consent, participants were shown a brief information sheet. They were then asked to provide ratings of perceived abilities for four entities (a rock, a dog, a humanoid robot, and a human), as in the original validation study [9], using the 14 items of the Italian AAS on a 5-point Likert scale ranging from 1 = "Per niente d'accordo" (Strongly disagree) to 5 = "Completamente d'accordo" (Strongly agree). An example of one of the items used in the study would be "Un robot umanoide può pensare a un'idea" (A humanoid robot can think about an idea).

3 Results

200 native Italian speakers were recruited via Prolific and participated in the study. Their mean age was M = 36.35 (SD = 10.48), and there were 88 females.

The Italian version of the AAS demonstrated good internal consistency across all four entities. Cronbach's α coefficients [12] were .86 for the rock (M = 1.16, SD = .33), .89 for the robot (M = 2.68, SD = .73), .87 for the dog (M = 3.77, SD = .59), and .78

for the human (M = 4.90, SD = .19), indicating acceptable to good reliability.

Although reliability coefficients were high, the corrected item-total correlations (CITCs) indicated that no items were redundant, supporting conceptual diversity within the construct. For most items, the CITCs ranged from .30 to .77, showing adequate item discrimination. For the rock, the CITCs ranged from .39 and .77. For the robot, they went from .41 and .66, suggesting strong inter-item coherence. For the dog, most CITCs ranged from .38 to .70, except Q13 (.28), which was below the .30 threshold, possibly because participants found Q13 ("può vivere illusioni ottiche o altre illusioni percettive") less applicable to animals. For the human, 12 items had CITCs ranging from .30 to .57 while 2 of the items showed lower correlations: Q03 (.25) and Q10 (.11) reflected reduced variance and potential ceiling effects, as nearly all participants strongly agreed with the human-awareness items.

Despite these minor variations, the reliability coefficients across entities confirm that the Italian AAS maintains internal coherence and conceptual equivalence with the original English version; particularly for the robot entity, which is the scale's main target for future use. All 14 items were retained to preserve the theoretical integrity of the scale and ensure comparability across entities and languages.

4 Discussion

The current study translates, adapts and validates the Italian version of the AAS, a psychometric tool developed to measure perceived awareness across different types of entities, including artificial agents. The translation and back-translation process with expert review established semantic and conceptual equivalence with the original English version. The subsequent validation with Italian participants confirmed that the scale retained its psychometric robustness and reproduced the same awareness attribution pattern as the original study: the human receiving the highest ratings, followed by the dog, the robot and the rock.

The internal reliability of the Italian AAS was good to excellent across all entities, with Cronbach's α values ranging from .78 to .89, indicating that the Italian version preserves the structural coherence and theoretical integrity of the scale. Minor variations in corrected item-total correlations were observed, particularly for Q13 ("can experience optical illusions or other perception illusions") in the dog, and for Q03 ("can think about an idea") and Q10 ("has mind processes similar to the ones happening in a brain") in the human. These deviations are consistent with previous findings that ceiling effects can occur when participants rate human entities, as humans are typically seen as maximally aware [9]. Similarly, the lower discrimination of the "illusion" item for the dog likely reflects a conceptual boundary of applying perceptual or cognitive phenomena to animals. These findings do not undermine the overall coherence of the scale but instead highlight subtle differences in how participants interpret awareness-related constructs across entities. In addition, these limitations did not affect the robot, that is the scale's primary future focus. For the robot, all items showed strong discrimination and the highest overall internal reliability, indicating that the Italian version performs optimally for its intended application.

The replication of the awareness attribution spectrum (human > dog > robot > rock) suggests that participants interpret awareness in hierarchical anthropocentric way. The robot's intermediate position between living and non-living entities may highlight people's tendency to partially extend awareness-related concepts to artificial systems while still perceiving them as different from beings that are alive.

This research supports the cross-cultural generalizability of the AAS and opens the possibility of conducting comparative studies on awareness attribution between countries. Understanding cultural variability in attitudes toward robots is particularly relevant for interpreting these findings. Previous research in HRI has shown that perceptions of robots differ across cultural contexts, influencing trust, acceptance, and expectations of robot capability. Comparative studies have reported differences in anthropomorphism, emotional stance, and preferred interaction styles across countries and cultural groups [13, 14]. These patterns have often been used to support assumptions (such as the idea that some cultures view robots more positively than others) but empirical work shows that these differences are more complex and not necessarily reflect stereotypes [15]. This suggests that culture does affect HRI, but not always in simple or stereotypical ways. This reinforces the relevance of cross-cultural research, particularly studies that rely on validated measurement tools.

Beyond national-level, studies have shown that relational or group-oriented identity styles can shape social expectations, preferred communication strategies, and attributions of intention or agency during interaction [16]. These findings imply that cultural influences on HRI operate at multiple levels. This literature highlights the importance of using culturally adapted and validated instruments when studying constructs such as awareness attribution. By providing a reliable Italian version of the AAS, the present study contributes to building the methodological foundation required for cross-cultural comparisons. Such tools can help investigate not only whether different populations attribute awareness to robots to different degrees, but also how cultural frameworks shape the interpretation of "awareness" in artificial systems.

Overall, the Italian validation of the AAS demonstrates that the instrument can reliably capture individual differences in attributed awareness within a new cultural context. The results provide evidence for measurement invariance of awareness attribution across languages and cultures. Future work may expand the validation to other languages and, additionally, explore how factors such as religion, technological familiarity, or exposure to robots influence awareness attribution across cultures.

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