

## D1.2 Rwandan Cultural Knowledge

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## Executive Summary

Deliverable D1.2 comprises a catalogue of general, population-based cultural knowledge in the form of behaviors, activities, actions, and movements that are either culturally sensitive or culturally insensitive. This knowledge will be used to specify the culturally sensitive African modes of social interaction in Deliverable D1.3 and the Africa-centric design patterns in Deliverable D1.4. It will be formalized in the cultural knowledge ontology and knowledge base in Deliverable D5.4.1. The cultural knowledge will be gathered by developing a detailed questionnaire and using it to interview a cross-section of Rwandan citizens. **The first draft of the deliverable presented the survey questionnaire, in both English and Kinyarwanda, so that it could be validated before conducting the survey. It also presented a draft cultural knowledge ontology.** The survey questionnaire is now online and a pilot survey has been completed. The Kinyarwanda version is available [here](#) and the English version is available [here](#). **This second draft of the deliverable presents a revised cultural knowledge ontology and, based on the ontology, a proposed representation of cultural knowledge.**

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## 1 Introduction

This report will be a compilation of the culture-specific knowledge that is needed to achieve culturally-competent human robot interaction between robots and Rwandan people. The knowledge focusses on human-human interaction, rather than human-robot interaction. Appropriate elements of this knowledge will then be used in Tasks 1.3 and 1.4 to specify culturally sensitive modes of robot behavior for human-robot interaction. This approach was adopted to avoid introducing the concept of social robots, something that may not be familiar to all participants in the survey, when canvassing their views. It is planned to conduct this canvassing exercise using the questionnaire in Appendix I (English) and Appendix II (Kinyarwanda).

The first draft of the deliverable focussed on the survey questionnaire, so that it could be validated prior to conducting the survey. It also presented a draft cultural knowledge ontology. The survey is now online. The Kinyarwanda version is available [here](#) and the English version is available [here](#).

This second draft of the deliverable presents a revised cultural knowledge ontology and, based on the ontology, a proposed representation of cultural knowledge.

## 2 Rwandan Cultural Knowledge for Respectful Interaction

The cultural knowledge will be structured according to an ontology of cultural knowledge for respectful interaction detailed in Appendix III. This ontology is a preemptive attempt at the ontology design exercise in Task 5.4.1.

Subsequent versions of this deliverable will address the identification of the respondents who will be canvassed, with the goal of compiling responses from an broad cross-section of people and, thereby, creating an unbiased and representative knowledge base.

The final version will present the results of the exercise — Rwandan cultural knowledge for polite and respectful interaction — which will then be used as input to Task 1.2 African Modes of Social Interaction, Task 1.3 Africa-centric Design Patterns, and Task 5.4.1 Cultural Knowledge Ontology & Knowledge Base.

## 3 Representation of Cultural Knowledge

As noted above, the goal of the Task 1.2 is to compile the cultural knowledge required for culturally sensitive human robot interaction between robots and Rwandan people, and catalogue the knowledge in this deliverable. To be effective, this knowledge must be organized in some manner. This organization is effectively the knowledge ontology that is to be produced in Task 5.4.1. Since that task is delayed, we have made a preemptive attempt at designing the ontology here; see Appendix III.

However, by itself, this is insufficient, since the knowledge base that is to be used by the robot must be populated by the knowledge that is derived from the survey questionnaire in Appendix I and Appendix II. Therefore, it must be possible to map the knowledge in the answers to each question in the survey to the ontology.

Furthermore, a way of representing this knowledge is also needed. Strictly, this too would have been defined in Deliverable D5.4.1. Consequently, we engage here in another preemptive exercise, and propose a knowledge representation based on the classification of knowledge suggested by Barbara Bruno et al. [1]. This required a slight revision of the initial cultural knowledge ontology in Appendix III to align it more closely with the parameters of the robot actions, as suggested in [1].

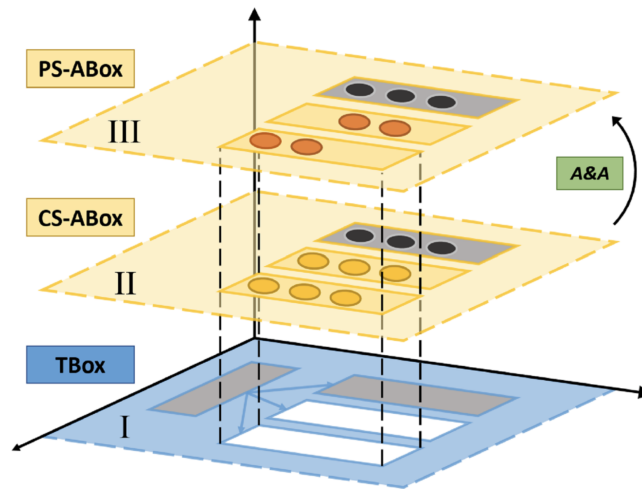


Figure 1: Knowledge representation architecture for a culturally competent robot. The bottom TBox layer (Layer I) defines the ontology for all knowledge, including domain-specific ontologies and upper ontologies that provide interoperability among domain-specific ontologies (grey boxes), and ontologies that model cultural-knowledge (white boxes). The middle CS-ABox layer (Layer II) is the culture-specific layer which includes instances of national-level cultural knowledge (yellow circles), as well as instances of knowledge from domain-specific ontologies and upper ontologies (grey circles). The top PS-ABox layer (Layer III) is the person-specific layer which includes instances of knowledge about the user (orange circles), as well as instances of knowledge from domain-specific ontologies and upper ontologies (grey circles). (From Bruno et al. 2019 [1].)

In the following, we summarize the knowledge representation architecture and knowledge classification suggested by Bruno et al. [1] and explain how adopting elements of this classification facilitates the creation of a knowledge representation that can be used in the CSSR4Africa system.

We explain how the answers to each question in the survey can be mapped to the ontology. We then define a simple representation of the knowledge using key-value pairs, with keys derived from the ontology.

Finally, we propose a candidate set of values for each key-value pair. These values will be adjusted and finalized, based on the answers to the questions in the survey, and documented in the next version of this deliverable.

### 3.1 Knowledge Classification

Barbara Bruno et al. [1] propose a knowledge representation architecture for a culturally competent robot; see Fig. 1. This architecture has three layers, each capturing a different element of the knowledge specification. The bottom layer is a terminological box (TBox). This is where the ontology proper is specified. The middle and top layers are assertional boxes (ABox). This is where the culture-specific and person-specific knowledge (defined by the ontology) is stored. In more detail, the three elements of the knowledge representation architecture are as follows.

**Culture-generic knowledge ontology** captured in the bottom TBox layer (Layer I). This defines the ontology for all knowledge, including domain-specific ontologies and upper ontologies that provide interoperability among domain-specific ontologies (grey boxes), and ontologies that model cultural-knowledge (white boxes).

**Culture-specific knowledge** is captured in the middle CS-ABox layer (Layer II). Specifically it includes instances of national-level cultural knowledge (yellow circles), as well as instances of knowledge from domain-specific ontologies and upper ontologies.

**Person-specific knowledge** is captured in the top PS-ABox layer (Layer III), including instances of knowledge about the user (orange circles), as well as instances of knowledge from domain-specific ontologies and upper ontologies

The culture-generic knowledge ontology captures eight types of knowledge, grouped in three classes of knowledge.

1. Context knowledge.
  - (a) Knowledge about the assisted person.
  - (b) Knowledge about the environment.
2. Robot knowledge.
  - (a) Knowledge about the actions that the robot can perform.
  - (b) Knowledge about the parameters of these actions.
  - (c) Knowledge about how actions can be combined into higher-level behaviours.
3. Core values knowledge.
  - (a) Knowledge about the goals of the robot mission.
  - (b) Knowledge about social norms; these might be considered additional culturally-grounded goals, i.e., constraints on goals, planning operators, action, and cultural parameters.
  - (c) Knowledge about conversational subject matter.

Here, we are concerned with knowledge about the actions that the robot can perform and knowledge about the parameters of these actions. Specifically, the values we use for these parameters determines the culturally sensitive nature of the robot's actions. These values are then used by the various ROS nodes in the CSSR4Africa system when invoking actions through ROS service requests. The values themselves are derived from the consensus answers to the survey questions.

While Bruno et al. [1] use OWL-2 language to define their ontology, we adopt a simpler approach here that represents the ontology as a tree of concepts, as shown in Appendix III. This provides us with a straightforward way to specify the parameter values for each element in the taxonomy: we can represent the cultural knowledge with a simple list of key-value pairs, where a key is constructed from the name of a leaf nodes in the taxonomy tree and the name of its parent. The values can be either quantitative numeric values or qualitative symbolic values, which can then be interpreted by the ROS node that uses the key-value pair to produce culturally sensitive behaviour. If the survey answers require more than one value for a key, this can be accommodated by appending a suffix to the key, e.g., `SymbolicShapeWelcome` instead of `SymbolicShape`, and updating the ontology accordingly.

Table 1 lists the keys derived from the taxonomy tree, and identifies the questions in Parts 2 and 3 of the survey that reveal the associated cultural knowledge. For ease of reference, a list of the opening part of each question is provided in Tables 2 and 3.

Table 4 lists the keys derived from the taxonomy tree, and, in the next version of this deliverable, it will identify the possible numeric and symbolic values that can be associated with these keys based on the answers to the questions in the survey.

Key	Questions
<b>Spatial Interaction</b>	
StandingDistance	
StandingOrientation	
ApproachingDistance	
ApproachingOrientation	
ApproachingVelocity	
PassingDistance	3-1
PassingVelocity	
PassingPosition	2-26, 3-3
AccompanyingDistance	2-27, 3-4, 3-5, 3-6
AccompanyingPosition	
<b>Verbal Interaction</b>	
WordLoudness	2-24
WordSpeed	
FillerSound	
FillerFrequency	
PauseFrequency	
PauseDuration	3-10
TurnTakingUtterance	2-19, 2-23, 3-11
TurnTakingDuration	
<b>Non-Verbal Interaction</b>	
<b>Gaze</b>	
FocusofAttentionTarget	2-1, 2-2, 2-16, 3-12, 3-16
FocusofAttentionDuration	
FocusofAttentionFrequency	
EyeContactDuration	2-3, 2-4, 2-5, 3-2
EyeContactFrequency	3-13, 3-14, 3-15, 3-17, 3-18, 3-19
<b>Face or Head Gesture</b>	
LipShape	
LipIntensity	
EyebrowShape	3-2
EyebrowIntensity	
NodExtent	3-2, 3-20, 3-21, 3-22, 3-23, 3-24, 3-25, 3-26, 3-27
NodVelocity	
<b>Hand Gesture</b>	
DeicticShape	2-6, 2-7, 2-8
DeicticDuration	
IconicShape	3-29, 3-30
SymbolicShape	2-10, 3-2, 3-21, 3-22, 3-23, 3-24, 3-25, 3-26, 3-27
BeatShape	
BeatIntensity	
BeatFrequency	
<b>Body Gesture</b>	
BowExtent	2-9, 2-16, 2-17, 3-21, 3-22, 3-23, 3-24, 3-25, 3-26, 3-27
BowVelocity	
SwayIntensity	3-21, 3-22, 3-23, 3-24, 3-25, 3-26, 3-27
SwayFrequency	

Table 1: Keys for specifying culturally sensitive actions and the questions in Parts 2 and 3 of the survey that reveal the associated cultural knowledge.

2-1		To show respect, one should lower gaze when greeting someone older.
2-2		One should suspend work or movements and pay attention when addressed.
2-3		One should keep intermittent eye contact; lack of eye contact depicts disrespect as it shows divided attention during the interaction.
2-4		One should not make persistent eye contact with an older person.
2-5		One should not make eye contact when being corrected by someone.
2-6		One should use an open palm of the hand to point to people and objects.
2-7		One should not point an upward facing palm of the hand at someone.
2-8		One should not use the left hand to point to anything.
2-9		To show respect, one should bow slightly when greeting someone older.
2-10		To show respect, one should raise both hands when greeting.
2-11	*	One should not wave at someone from a distance; one should move towards them to greet them.
2-12	*	One should not use the left hand to hand something to someone.
2-13	*	To show respect, one should hand over and accept gifts with two hands and do so from the front, facing the recipient.
2-14	*	To show respect, one should shake hands with the right hand and use the left arm to support the right forearm when doing so.
2-15	*	An appreciation of rhythmic sound and movement is valued.
2-16		To show respect, one should bow slightly and lower gaze when greeting someone older.
2-17		The younger interaction partner should bow when greeting an older person or when rendering a service.
2-18	*	All interactions should begin with a courteous greeting.
2-19		The younger interaction partner should enable a greeting to be initiated by an older person.
2-20	*	It is respectful to use local languages and they should be used for verbal interaction when possible.
2-21	*	One should use formal titles when addressing someone.
2-22	*	One should engage in a preamble before getting to the point, as being too forward may be regarded as disrespectful.
2-23		One should not interrupt or talk over someone when they are speaking.
2-24		One should not talk loudly to an older person.
2-25	*	Behaviours should focus on fostering social connections and relationships; they should not be purely functional.
2-26		One should not walk between two or more people who are conversing because it is considered rude to do so.
2-27		One should not walk far ahead of an older person, unless leading the person (in which case, one should walk slightly to the side).

Table 2: Survey questions - Part 2. Questions with an asterisk do not map to any of the ontology keys.



3-1		What distance should you keep when passing someone?
3-2		How should you acknowledge someone when passing them?
3-3		How should you pass a group of two or more people?
3-4		When showing someone older than you the way, where should you position yourself?
3-5		When showing someone the same age as you the way, where should you position yourself?
3-6		When showing someone younger than you the way, where should you position yourself?
3-7	*	How should you address someone who is older than you and who you haven't met before?
3-8	*	How should you address someone who is the same age as you and who you haven't met before?
3-9	*	How should you address someone who is younger than you and who you haven't met before?
3-10		Should you pause before responding when someone asks you a question? If yes, for how long?
3-11		In an interaction where you and someone else take turns to speak, would you signal that you want to speak? If yes, how do you do that?
3-12		If you are explaining something to someone, what is your primary focus of attention, i.e., where do you direct your gaze?
3-13		If you are explaining something to someone, how often should you make eye contact?
3-14		If you are explaining something to someone, how often would you make eye contact if the person was older than you?
3-15		If you are explaining something to someone, how often would you make eye contact if the person was younger than you?
3-16		If someone is explaining something to you, what is your primary focus of attention, i.e., where do you direct your gaze?
3-17		If someone is explaining something to you, how often should you make eye contact?
3-18		If someone is explaining something to you, how often would you make eye contact if the person was older than you?
3-19		If someone is explaining something to you, how often would you make eye contact if the person was younger than you?
3-20		Would you use a face or head gesture to draw someone's attention to something? If yes, what would that gesture be?
3-21		Would you use a face, head, hand, or body gesture to express gratitude?
3-22		Would you use a face, head, hand, or body gesture to express agreement?
3-23		Would you use a face, head, hand, or body gesture to express respect?
3-24		Would you use a face, head, hand, or body gesture to express friendliness?
3-25		Would you use a face, head, hand, or body gesture to express confusion?
3-26		Would you use a face, head, hand, or body gesture to express comprehension?
3-27		Would you use a face, head, hand, or body gesture to express interest?
3-28	*	Is there a face head, hand, or body gesture you should not use?
3-29		Would you use a hand or body gesture while speaking to someone?
3-30		Would you use a hand or body gesture while listening to someone?

Table 3: Survey questions – Part 3. Questions with an asterisk do not map to any of the ontology keys.

Key	Values
<b>Spatial Interaction</b>	
	StandingDistance StandingOrientation ApproachingDistance ApproachingOrientation ApproachingVelocity PassingDistance PassingVelocity PassingPosition AccompanyingDistance AccompanyingPosition
<b>Verbal Interaction</b>	
	WordLoudness WordSpeed FillerSound FillerFrequency PauseFrequency PauseDuration TurnTakingUtterance TurnTakingDuration
<b>Non-Verbal Interaction</b>	
<b>Gaze</b>	
	FocusofAttentionTarget FocusofAttentionDuration FocusofAttentionFrequency EyeContactDuration EyeContactFrequency
<b>Face or Head Gesture</b>	
	LipShape LipIntensity EyebrowShape EyebrowIntensity NodExtent NodVelocity
<b>Hand Gesture</b>	
	DeicticShape DeicticDuration IconicShape SymbolicShape BeatShape BeatIntensity BeatFrequency
<b>Body Gesture</b>	
	BowExtent BowVelocity SwayIntensity SwayFrequency

Table 4: Key-value pairs for specifying culturally sensitive actions.

## Appendix I: Cultural Knowledge Survey Questionnaire (English)

### Respectful Interaction

In daily life, people interact with one another in several ways. They interact verbally using speech and they interact non-verbally using body language, e.g. by gesturing with their hands, arms, shoulders, faces, lips, eyes, and eyebrows. During such social interaction, they often position their bodies in certain ways. It is highly desirable that all interaction between people be conducted in a respectful manner by being aware of social and cultural norms and expectations.

### Goal of the Survey

This survey aims to answer the following two questions: “How do you behave respectfully when interacting with people in Rwanda and how should you not behave?”

### Purpose of the Survey

The knowledge that is gathered in this survey will be used to equip social robots with cultural knowledge that will allow them to interact respectfully and politely with people using non-verbal, verbal, and spatial modes of behaviour.

### Structure of the Questionnaire

The questionnaire has three parts.

In Part 1, we ask you to provide some information about yourself. This information will be kept in strict confidence and it is only used to check that the survey is balanced in terms of age, gender, cultural heritage, and nationality.

In Part 2, we will ask you whether you consider cultural knowledge we have gathered in previous surveys<sup>1</sup> to be correct or not. The focus of these surveys was on human-robot interaction, derived from human-human interaction, and so the social settings reflects situations where one might encounter a social robot, e.g., hospitals, airports, exhibitions, shopping malls, and offices.

In Part 3, we ask you to answer several questions to help us identify different forms of culturally sensitive, respectful behaviours — movements, actions, or activities — and disrespectful behaviours.

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<sup>1</sup>We canvassed the views of twenty-three people from eight countries in Africa to collect this cultural knowledge.

**Part 1: Demographic Information**

1. What age are you?    ☐ 20–29   ☐ 30–39   ☐ 40–49   ☐ 50–59   ☐ 60 or more.
2. Which are you? ☐ Female   ☐ Male

**Part 2: Existing Cultural Knowledge**

Consider the following statements and select the option to indicate whether or agree with it or not.

1. To show respect, one should lower gaze when greeting someone older.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
2. One should suspend work or movements and pay attention when addressed.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
3. One should keep intermittent eye contact; lack of eye contact depicts disrespect as it shows divided attention during the interaction.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
4. One should not make persistent eye contact with an older person.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
5. One should not make eye contact when being corrected by someone.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
6. One should use an open palm of the hand to point to people and objects.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
7. One should not point an upward facing palm of the hand at someone.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
8. One should not use the left hand to point to anything.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.

9. To show respect, one should bow slightly when greeting someone older.
- ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
10. To show respect, one should raise both hands when greeting.
- ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
11. One should not wave at someone from a distance; one should move towards them to greet them.
- ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
12. One should not use the left hand to hand something to someone.
- ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
13. To show respect, one should hand over and accept gifts with two hands and do so from the front, facing the recipient.
- ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
14. To show respect, one should shake hands with the right hand and use the left arm to support the right forearm when doing so.
- ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
15. An appreciation of rhythmic sound and movement is valued.
- ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
16. To show respect, one should bow slightly and lower gaze when greeting someone older.
- ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.

17. The younger interaction partner should bow when greeting an older person or when rendering a service.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
18. All interactions should begin with a courteous greeting.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
19. The younger interaction partner should enable a greeting to be initiated by an older person.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
20. It is respectful to use local languages and they should be used for verbal interaction when possible.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
21. One should use formal titles when addressing someone.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
22. One should engage in a preamble before getting to the point, as being too forward may be regarded as disrespectful.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
23. One should not interrupt or talk over someone when they are speaking.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
24. One should not talk loudly to an older person.
  - ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.

25. Behaviours should focus on fostering social connections and relationships; they should not be purely functional.
- ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
26. One should not walk between two or more people who are conversing because it is considered rude to do so.
- ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.
27. One should not walk far ahead of an older person, unless leading the person (in which case, one should walk slightly to the side).
- ☐ Yes, this is correct.
  - ☐ No, this is not correct.
  - ☐ I am not sure.



**Part 3: New Cultural Knowledge**

1. What distance should you keep when passing someone?
  - ☐ Less than 1 m.
  - ☐ 1 – 2 m.
  - ☐ More than 2 m.
2. How should you acknowledge someone when passing them?
  - ☐ No acknowledgement.
  - ☐ Raise eyebrows slightly.
  - ☐ Nod head.
  - ☐ Say hello.
  - ☐ Other. Please specify: \_\_\_\_\_
3. How should you pass a group of two or more people?
  - ☐ Pass behind them.
  - ☐ Pass between them.
  - ☐ Pass in front of them.
  - ☐ Pass beside them.
4. When showing someone *older* than you the way, where should you position yourself?
  - ☐ Far in front of them.
  - ☐ A little in front of them.
  - ☐ Beside them.
  - ☐ A little behind them.
5. When showing someone *the same age* as you the way, where should you position yourself?
  - ☐ Far in front of them.
  - ☐ A little in front of them.
  - ☐ Beside them.
  - ☐ A little behind them.
6. When showing someone *younger* than you the way, where should you position yourself?
  - ☐ Far in front of them.
  - ☐ A little in front of them.
  - ☐ Beside them.
  - ☐ A little behind them.

7. How should you address someone who is *older* than you and who you haven't met before?
- ☐ First name.
  - ☐ Last name.
  - ☐ Title first name.
  - ☐ Title last name.
  - ☐ Muraho.
  - ☐ Mwaramutse or Mwiriwe
  - ☐ Other. Please specify: \_\_\_\_\_
8. How should you address someone who is *the same age* as you and who you haven't met before?
- ☐ First name.
  - ☐ Last name.
  - ☐ Title first name.
  - ☐ Title last name.
  - ☐ Muraho.
  - ☐ Mwaramutse or Mwiriwe
  - ☐ Other. Please specify: \_\_\_\_\_
9. How should you address someone who is *younger* than you and who you haven't met before?
- ☐ First name.
  - ☐ Last name.
  - ☐ Title first name.
  - ☐ Title last name.
  - ☐ Muraho.
  - ☐ Mwaramutse or Mwiriwe
  - ☐ Other. Please specify: \_\_\_\_\_
10. Should you pause before responding when someone asks you a question? If yes, for how long?
- ☐ Yes: \_\_\_\_\_
  - ☐ No.
11. In an interaction where you and someone else take turns to speak, would you signal that you want to speak? If yes, how do you do that?
- ☐ Yes: \_\_\_\_\_
  - ☐ No.

12. If *you* are explaining something to someone, what is your primary focus of attention, i.e., where do you direct your gaze?
- ☐ The object being explained.
  - ☐ The face, eyes, or mouth of the person to whom you are explaining.
  - ☐ Mostly the object and sometimes the person.
  - ☐ Mostly the person and sometimes the object.
  - ☐ Equally the person and the object.
13. If *you* are explaining something to someone, how often should you make eye contact?
- ☐ Never.
  - ☐ Occasionally.
  - ☐ Often.
  - ☐ Constantly.
14. If *you* are explaining something to someone, how often would you make eye contact if the person was older than you?
- ☐ Less often.
  - ☐ More often.
  - ☐ No difference.
15. If *you* are explaining something to someone, how often would you make eye contact if the person was younger than you?
- ☐ Less often.
  - ☐ More often.
  - ☐ No difference.
16. If someone is explaining something to *you*, what is your primary focus of attention, i.e., where do you direct your gaze?
- ☐ The object being explained.
  - ☐ The face, eyes, or mouth of the person to whom you are explaining.
  - ☐ Mostly the object and sometimes the person.
  - ☐ Mostly the person and sometimes the object.
  - ☐ Equally the person and the object.
17. If someone is explaining something to *you*, how often should you make eye contact?
- ☐ Never.
  - ☐ Occasionally.
  - ☐ Often.
  - ☐ Constantly.

18. If someone is explaining something to *you*, how often would you make eye contact if the person was older than you?
- ☐ Less often.
  - ☐ More often.
  - ☐ No difference.
19. If someone is explaining something to *you*, how often would you make eye contact if the person was younger than you?
- ☐ Less often.
  - ☐ More often.
  - ☐ No difference.
20. Would you use a face or head gesture to draw someone's attention to something?  
If yes, what would that gesture be?
- ☐ Yes: \_\_\_\_\_
  - ☐ No.
21. Would you use a face, head, hand, or body gesture to express *gratitude*?
- ☐ Yes:
    - What would the face or head gesture be? \_\_\_\_\_
    - What would the hand gesture be, and which hand would you use: left, right, either, or both? \_\_\_\_\_ , \_\_\_\_\_
    - What would the body gesture be? \_\_\_\_\_
  - ☐ No.
22. Would you use a face, head, hand, or body gesture to express *agreement*?
- ☐ Yes:
    - What would the face or head gesture be? \_\_\_\_\_
    - What would the hand gesture be, and which hand would you use: left, right, either, or both? \_\_\_\_\_ , \_\_\_\_\_
    - What would the body gesture be? \_\_\_\_\_
  - ☐ No.
23. Would you use a face, head, hand, or body gesture to express *respect*?
- ☐ Yes:
    - What would the face or head gesture be? \_\_\_\_\_
    - What would the hand gesture be, and which hand would you use: left, right, either, or both? \_\_\_\_\_ , \_\_\_\_\_
    - What would the body gesture be? \_\_\_\_\_
  - ☐ No.

24. Would you use a face, head, hand, or body gesture to express *friendliness*?

☐ Yes:

- What would the face or head gesture be? \_\_\_\_\_
- What would the hand gesture be, and which hand would you use: left, right, either, or both? \_\_\_\_\_ , \_\_\_\_\_
- What would the body gesture be? \_\_\_\_\_

☐ No.

25. Would you use a face, head, hand, or body gesture to express *confusion*?

☐ Yes:

- What would the face or head gesture be? \_\_\_\_\_
- What would the hand gesture be, and which hand would you use: left, right, either, or both? \_\_\_\_\_ , \_\_\_\_\_
- What would the body gesture be? \_\_\_\_\_

☐ No.

26. Would you use a face, head, hand, or body gesture to express *comprehension*?

☐ Yes:

- What would the face or head gesture be? \_\_\_\_\_
- What would the hand gesture be, and which hand would you use: left, right, either, or both? \_\_\_\_\_ , \_\_\_\_\_
- What would the body gesture be? \_\_\_\_\_

☐ No.

27. Would you use a face, head, hand, or body gesture to express *interest*?

☐ Yes:

- What would the face or head gesture be? \_\_\_\_\_
- What would the hand gesture be, and which hand would you use: left, right, either, or both? \_\_\_\_\_ , \_\_\_\_\_
- What would the body gesture be? \_\_\_\_\_

☐ No.

28. Is there a face head, hand, or body gesture you should *not* use?

☐ Yes:

- What would the face or head gesture be? \_\_\_\_\_
- What would the hand gesture be, and which hand would you use: left, right, either, or both? \_\_\_\_\_ , \_\_\_\_\_
- What would the body gesture be? \_\_\_\_\_

☐ No.

29. Would you use a hand or body gesture while speaking to someone?

☐ Yes:

- What would the hand gesture be, and which hand would you use: left, right, either, or both? \_\_\_\_\_ , \_\_\_\_\_
- What would the body gesture be? \_\_\_\_\_

☐ No.

30. Would you use a hand or body gesture while listening to someone?

☐ Yes:

– What would the hand gesture be, and which hand would you use: left, right, either, or both? \_\_\_\_\_ , \_\_\_\_\_

– What would the body gesture be? \_\_\_\_\_

☐ No.

## Appendix II: Cultural Knowledge Survey Questionnaire (Kinyarwanda)

### Igice 1: Umwirondoro

1. Imyaka ingahe? ☐ 20–29 ☐ 30–39 ☐ 40–49 ☐ 50–59 ☐ 60 cyangwa hejuru yayo.
2. Uri nde? ☐ Gore ☐ Gabo

**Igice 2: Ubumenyi bw'umuco buriho**

Soma neza interuro zikurikira, uhitemo YEGO cyangwa OYA mu gihe wemeranya niyo nteruro.

1. Mu buryo bwo kwerekana icyubahiro, umuntu agomba guca bugufi mu gihe asuhuza umuntu mukuru.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
2. Umuntu agomba guhagarika akazi yararimo nibyo yakoraga akumva umuntu umushaka icyo amushakira.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
3. Umuntu agomba guhuza amaso n'umuntu mu gihe bavugana; kudahuza amaso n'umuntu mu gihe muvugana byerekana ko wamusuzuguye kandi utamwitwayeho.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
4. Umuntu nttagomba guhuza amaso n'umuntu mukuru.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
5. Umuntu nttago agomba guhuza amaso n'umuntu Uri Kumukosora.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
6. Umuntu agomba gukoresha ikiganza gifunguye kugirango yerekane abantu nibintu.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
7. Umuntu nttagomba gutunga urutoki umuntu arwerekaza hejuru.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.



8. Umuntu ntagomba gukoresha ikiganza cy'ibumoso yerekana ikintu.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
9. Umuntu agomba guca bugufi mu gihe asuhuza umuntu mukuru.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
10. Muburyo bwo kwerekana icyubahiro, umuntu agomba gukoresha ibiganza byombi asuhuza umuntu.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
11. Umuntu ntagomba gupepera umuntu uri kure; agomba kumwegera akamusuhuza.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
12. Umuntu ntagomba guhereza ikintu umuntu akoresheje ikiganza cy'ibumoso.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
13. Mubyo bwo kwerekana icyubahiro, umuntu agomba kwakira impano akoresheje amaboko abiri kandi akanayakira ari imbere y'umuntu uyimuhaye.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
14. Mubyo bwo kwerekana icyubahiro, Umuntu agomba gusuhuzanya akoresheje ikiganza cy'iburyo akanakoresha ikiganza cy'ibumoso akagishyira ku cy'iburo mugihe asuhuzanya.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
15. Igihe umuntu yishimiye amajwi afite injyana no kuba habaho kugenda, bihabwa agaciro.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.

16. Mubyo bwo kwerekana icyubahiro, umuntu agomba guca bugufi mugihe asuhuza umuntu mukuru cyangwa ukuze.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
17. Umuntu muto agomba guca bufi mugihe asuhuza umuntu mukuru cyangwa amwaka ubufasha.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
18. Imikoranire yose igomba gutangirana indamutso.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
19. Umuntu muto agomba gutekereza umuntu mukuru akamurumutsa.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
20. Nibyiza gukoresha ururimi mwese muhuriyeho. Kandi rukanakoreshwa mu mikoranire mu magambo.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
21. Umuntu agomba gukoresha amazina y'icyubahiro mu gihe abwira umuntu.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
22. Umuntu agomba kubanza agasuhuza ndetse akanibwira abantu ashaka kubwira ikintu, kuko kuvuga uhita urasa ku ntego bigaragara nko kutubaha.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
23. Umuntu ntagomba kuvugira mu muntu uri kuvuga.
  - ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.

24. Umuntu ntagomba kuvugira hejuru mu gihe ambwira umuntu mukuru.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
25. Imyitwarire igomba kwibanda ku kunoza imibanire n'ubusabane; ntigomba kuba ijyanye n'akazi cg inshingano gusa.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
26. Umuntu ntagomba kunyura hagati y'abantu babiri bari kuganira kuko bigaraga nko kutubaha.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.
27. Umuntu ntagomba kugendera kure y'umuntu mukuru, ahubwo muricyo gihe umuntu agomba kugendera gacye kugirango abe kuruhande.
- ☐ Yego, nibyo.
  - ☐ Oya, ntago aribyo.
  - ☐ Ntago mbizi neza.

**Igice 3: Ubumenyi bushya bwumuco**

1. Ni iyihe ntera ugomba gushyiramo mu gihe uri kunyura ku muntu?
  - ☐ Minsi ya 1m
  - ☐ 1 – 2 m.
  - ☐ Hejuru 2 m.
2. Ni gute ugomba kwitwara mu gihe unyuze k'umuntu?
  - ☐ Nta kuntu ugomba kwitara.
  - ☐ Kubura amaso gato.
  - ☐ kumusuhuza.
  - ☐ Kuzunguza Umutwe.
  - ☐ Ibindi. Sobanura:\_\_\_\_\_
3. Ni gute ugomba kunyura ku bantu babiri cyangwa benshi?
  - ☐ Kubanyura inyuma.
  - ☐ Kubanyura hagati.
  - ☐ Kubanyura imbere.
  - ☐ Kubanyura Kumhande.
4. Mu gihe uri kwereka inzira umuntu ukuruta,ni hehe ugomba kuba uri hehe cyangwa uhagaze hehe?
  - ☐ kure ho imbere yabo.
  - ☐ Imbere yabo gato.
  - ☐ Iruhande rwabo.
  - ☐ Inyuma yabo gato.
5. Mu gihe uri kwereka inzira umuntu mungana,ugomba kuba uri hehe cyangwa uhagaze hehe?
  - ☐ kure ho imbere yabo.
  - ☐ Imbere yabo gato.
  - ☐ Iruhande rwabo.
  - ☐ Inyuma yabo gato.
6. Mu gihe uri kwereka inzira umuntu muto kuri wowe,ugomba kuba uri hehe cyangwa uhagaze hehe?
  - ☐ kure ho imbere yabo.
  - ☐ Imbere yabo gato.
  - ☐ Iruhande rwabo.
  - ☐ Inyuma yabo gato.

7. Ni gute ushobora kwita umuntu ukuruta kandi mutanahuye na mbere?
- ☐ Izina rya mbere.
  - ☐ Izina rya kabiri.
  - ☐ (Bwana, Madamu...) Izina rya mbere.
  - ☐ (Bwana, Madamu...) Izina rya kabiri.
  - ☐ Muraho.
  - ☐ Mwaramutse or Mwiriwe
  - ☐ Ibindi. sobanura: \_\_\_\_\_
8. Ni gute ushobora kwita umuntu muri mu kigero kimwe kandi mutanahuye na mbere?
- ☐ Izina rya mbere.
  - ☐ Izina rya kabiri.
  - ☐ (Bwana, Madamu, Dr, Prof,...) Izina rya mbere.
  - ☐ (Bwana, Madamu, Dr, Prof,...) Izina rya kabiri.
  - ☐ Muraho.
  - ☐ Mwaramutse or Mwiriwe
  - ☐ Ibindi. sobanura: \_\_\_\_\_
9. Ni gute ushobora kwita umuntu muto kuri wowe kandi mutanahuye na mbere?
- ☐ Izina rya mbere.
  - ☐ Izina rya kabiri.
  - ☐ (Bwana, Madamu...) Izina rya mbere.
  - ☐ (Bwana, Madamu...) Izina rya kabiri.
  - ☐ Muraho.
  - ☐ Mwaramutse or Mwiriwe
  - ☐ Ibindi. sobanura: \_\_\_\_\_
10. Ugomba kwitonda ho gato, mbere yo gusubiza ikibazo umuntu akubajije? Niba ari yego, bigomba kumpara igihe kingana gute?
- ☐ Yego: \_\_\_\_\_
  - ☐ Oya.
11. Mu biganiriro aho wowe nundi muntu bisaba ko mwaka ijamba kugirango muvuge, ni ngombwa ko werekane ko ushaka kuvuga? Niba ari yego, wabikora ute?
- ☐ Yego: \_\_\_\_\_
  - ☐ Oya.
12. Mu gihe uri gusobanurira umuntu ikintu, ni kihe kintu ugomba kubanza kwitaha, urugero, ni hehe ugomba kwibanda ?
- ☐ Ku kintu urigusobanura.
  - ☐ Mwisura, mu maso cyangwa ku munwa w'umuntu uri gusobanurira..
  - ☐ Cyane cyane umuntu, rimwe na rimwe nikintu.

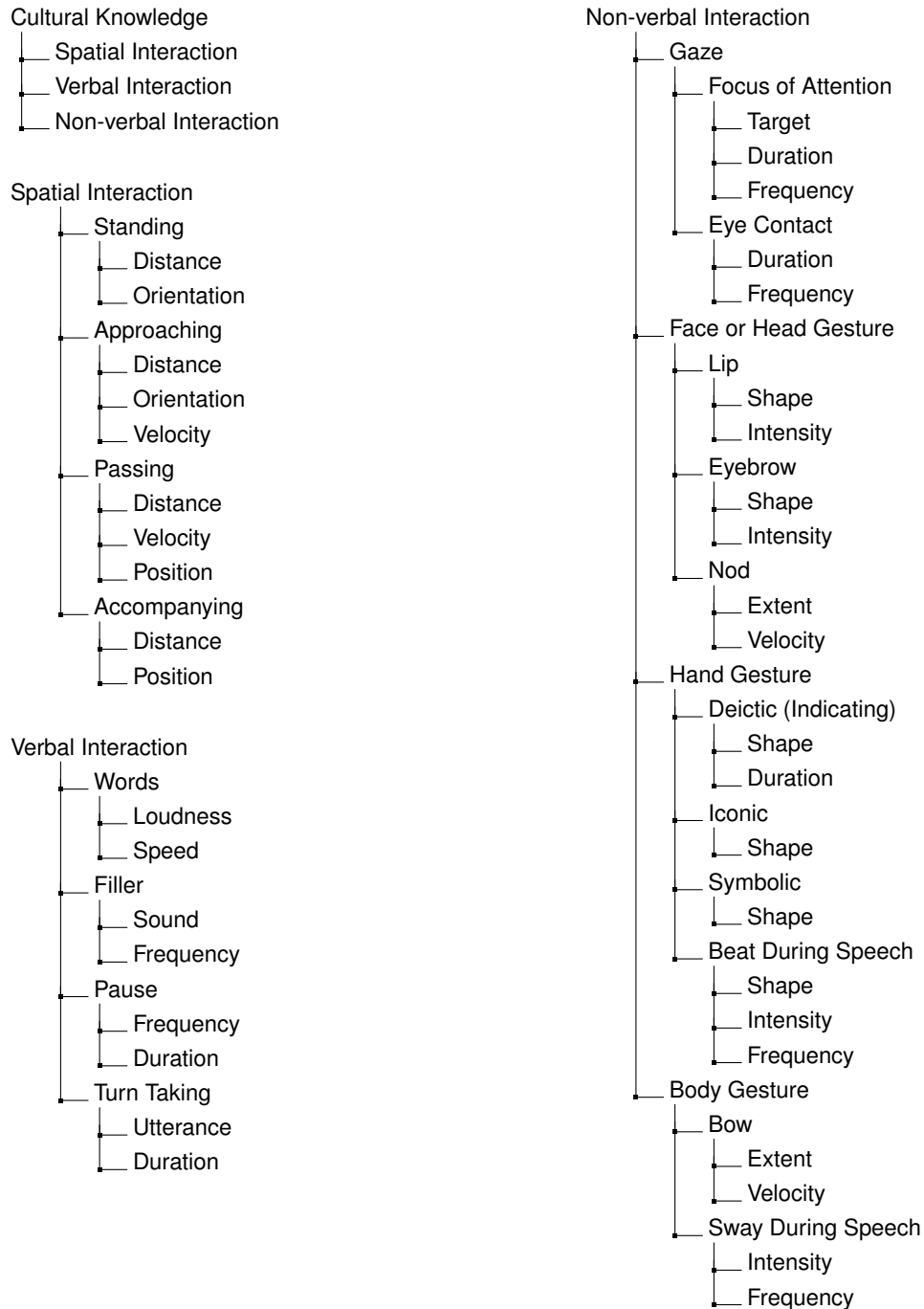
- ☐ Byose icyarimwe umuntu nikintu.
13. Niba uri gusobanurira umuntikintu, Ni ryari mugomba guhuza amaso?
- ☐ Nta na rimwe.
- ☐ Rimwe na rimwe.
- ☐ Akenshi.
- ☐ Bihoraho.
14. Mu gihe uri gusobanurira ikintu umuntu, ni ryari mugomba guhuza amaso niba uwo muntu akuruta?
- ☐ Bitari kenshi.
- ☐ kenshi Cyane.
- ☐ Nta tandukaniro.
15. Mu gihe uri gusobanurira ikintu umuntu, ni ryari mugomba guhuza amaso niba uwo muntu ari muto kuri wowe?
- ☐ Bitari kenshi.
- ☐ kenshi Cyane.
- ☐ Nta tandukaniro.
16. Mu gihe uri gusobanurira umuntu ikintu, ni kihe kintu ugomba kubanza kwitaha, urugero, ni hehe ugomba kwibanda?
- ☐ Ku kintu urigusobanura.
- ☐ Mwisura, mu maso cyangwa ku munwa w'umuntu uri gusobanurira.
- ☐ Cyane cyane umuntu, rimwe na rimwe nikintu
- ☐ Byose icyarimwe umuntu nikintu.
17. Mu gihe umuntu ari ku gusobanurira ikintu , ni ryari ugomba guhuza amaso nawe?
- ☐ Nta na rimwe.
- ☐ Rimwe na rimwe.
- ☐ Kenshi.
- ☐ Bihoraho.
18. Mu gihe umuntu ari ku gusobanurira ikintu , ni ryari ugomba guhuza amaso nawe mu gihe uwo muntu akuruta?
- ☐ Bitari kenshi.
- ☐ kenshi Cyane.
- ☐ Nta tandukaniro.
19. Mu gihe umuntu ari ku gusobanurira ikintu , ni ryari ugomba guhuza amaso nawe mu gihe uwo muntu ari muto kuri wowe?
- ☐ Bitari kenshi.
- ☐ kenshi Cyane.
- ☐ Nta tandukaniro.

20. Ushobora gukoresha amarenga mu maso werekana ko witondeye ikintu?  
Niba ari yego, ayo marenga yaba ari ayahe?
- ☐ Yego: \_\_\_\_\_
- ☐ Oya.
21. Ushobora gukoresha amarenga yo mu maso, umutwe, y'ikiganza cyangwa umubiri ugaragaza *gushimira*?
- ☐ Yego:
- Ni ibihe bimenyetso byo mu maso cyangwa umutwe? \_\_\_\_\_
  - Ni ikihe bimenyetso by' ikiganza, ni ikihe kiganza ushobora gukoresha :ubumoso, uburyo, kimwe muri byo cyangwa byose? \_\_\_\_\_ , \_\_\_\_\_
  - Ni ibihe bimenyetso by'umubiri wakoresha? \_\_\_\_\_
- ☐ Oya.
22. Ushobora gukoresha amarenga yo mu maso, umutwe, y'ikiganza cyangwa umubiri ugaragaza *kwemeranya*?
- ☐ Yego:
- Ni ibihe bimenyetso byo mu maso cyangwa umutwe? \_\_\_\_\_
  - Ni ikihe bimenyetso by' ikiganza, ni ikihe kiganza ushobora gukoresha :ubumoso, uburyo, kimwe muri byo cyangwa byose? \_\_\_\_\_ , \_\_\_\_\_
  - Ni ibihe bimenyetso by'umubiri wakoresha? \_\_\_\_\_
- ☐ Oya.
23. Ushobora gukoresha amarenga yo mu maso, umutwe, y'ikiganza cyangwa umubiri ugaragaza ko utanze *icyubahiro*?
- ☐ Yego:
- Ni ibihe bimenyetso byo mu maso cyangwa umutwe? \_\_\_\_\_
  - Ni ikihe bimenyetso by' ikiganza, ni ikihe kiganza ushobora gukoresha :ubumoso, uburyo, kimwe muri byo cyangwa byose? \_\_\_\_\_ , \_\_\_\_\_
  - Ni ibihe bimenyetso by'umubiri wakoresha? \_\_\_\_\_
- ☐ Oya.
24. Ushobora gukoresha amarenga yo mu maso, umutwe, y'ikiganza cyangwa umubiri ugaragaza *ubushuti*?
- ☐ Yego:
- Ni ibihe bimenyetso byo mu maso cyangwa umutwe? \_\_\_\_\_
  - Ni ikihe bimenyetso by' ikiganza, ni ikihe kiganza ushobora gukoresha :ubumoso, uburyo, kimwe muri byo cyangwa byose? \_\_\_\_\_ , \_\_\_\_\_
  - Ni ibihe bimenyetso by'umubiri wakoresha? \_\_\_\_\_
- ☐ Oya.
25. Ushobora gukoresha amarenga yo mu maso, umutwe, y'ikiganza cyangwa umubiri ugaragaza *urujijo*?
- ☐ Yego:
- Ni ibihe bimenyetso byo mu maso cyangwa umutwe? \_\_\_\_\_

- Ni ikihe bimenyetso by’ ikiganza, ni ikihe kiganza ushobora gukoresha :ubumoso, uburyo, kimwe muri byo cyangwa byose? \_\_\_\_\_, \_\_\_\_\_
- Ni ibihe bimenyetso by’umubiri wakoresha? \_\_\_\_\_
- ☐ Oya.
26. Ushobora gukoresha amarenga yo mu maso, umutwe, y’ikiganza cyangwa umubiri ugaragaza ko wumvise cyangwa *wasobanukiwe*?
- ☐ Yego:
- Ni ibihe bimenyetso byo mu maso cyangwa umutwe? \_\_\_\_\_
- Ni ikihe bimenyetso by’ ikiganza, ni ikihe kiganza ushobora gukoresha :ubumoso, uburyo, kimwe muri byo cyangwa byose? \_\_\_\_\_, \_\_\_\_\_
- Ni ibihe bimenyetso by’umubiri wakoresha? \_\_\_\_\_
- ☐ Oya.
27. Ushobora gukoresha amarenga yo mu maso, umutwe, y’ikiganza cyangwa umubiri ugaragaza *ushishikajwe*?
- ☐ Yego:
- Ni ibihe bimenyetso byo mu maso cyangwa umutwe? \_\_\_\_\_
- Ni ikihe bimenyetso by’ ikiganza, ni ikihe kiganza ushobora gukoresha :ubumoso, uburyo, kimwe muri byo cyangwa byose? \_\_\_\_\_, \_\_\_\_\_
- Ni ibihe bimenyetso by’umubiri wakoresha? \_\_\_\_\_
- ☐ Oya.
28. Hari amarenga ya maso, y’ikiganza cyangwa y’ umubiri udashobora *gukoresha*?
- ☐ Yego:
- Ni ibihe bimenyetso byo mu maso cyangwa umutwe? \_\_\_\_\_
- Ni ikihe bimenyetso by’ ikiganza, ni ikihe kiganza ushobora gukoresha :ubumoso, uburyo, kimwe muri byo cyangwa byose? \_\_\_\_\_, \_\_\_\_\_
- Ni ibihe bimenyetso by’umubiri wakoresha? \_\_\_\_\_
- ☐ Oya.
29. Ushobora gukoresha amarenga y’ikiganza cyangwa ayandi y’umubiri mu gihe uri *kuvugana numuntu*?
- ☐ Yego:
- Ni ikihe bimenyetso by’ ikiganza, ni ikihe kiganza ushobora gukoresha :ubumoso, uburyo, kimwe muri byo cyangwa byose? \_\_\_\_\_, \_\_\_\_\_
- Ni ibihe bimenyetso by’umubiri wakoresha? \_\_\_\_\_
- ☐ Oya.
30. Ushobora gukoresha amarenga y’ikiganza cyangwa y’umubiri mu gihe urikumva *umuntu*?
- ☐ Yego:
- Ni ikihe bimenyetso by’ ikiganza, ni ikihe kiganza ushobora gukoresha :ubumoso, uburyo, kimwe muri byo cyangwa byose? \_\_\_\_\_, \_\_\_\_\_
- Ni ibihe bimenyetso by’umubiri wakoresha? \_\_\_\_\_
- ☐ Oya.



## Appendix III: Cultural Knowledge Ontology for Respectful Interaction



## References

- [1] B. Bruno, C. T. Recchiuto, I. Papadopoulos, A. Saffiotti, C. Koulouglioti, R. Menicatti, F. Mastrogiovanni, R. Zaccaria, and A. Sgorbissa. Knowledge representation for culturally competent personal robots: requirements, design principles, implementation, and assessment. *International Journal of Social Robotics*, 11(3):515–538, 2019.

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## Document History

### Version 1.0

First draft with survey questionnaire, for validation before conducting the survey.

David Vernon.

25 October 2023.

### Version 1.1

Fixed minor typos.

David Vernon.

2 November 2023.

### Version 1.2

Changed male/female to man/woman to determine the gender of the respondent.

Explained the context of the existing cultural knowledge.

Removed the question about name, to keep the survey anonymous.

Replaced question about being Rwandan by two questions on cultural heritage and nationality.

Removed the < 20 age group.

David Vernon.

20 November 2023.

### Version 1.3

Changed the answers in Part 2 from I agree / do not agree to this is / is not correct.

David Vernon.

20 November 2023.

### Version 1.4

Removed several questions from Part 3 to align them with the CSSR4All questionnaire.

David Vernon.

1 December 2023.

### Version 1.5

Remove two questions from Part One. Group face, hand, and body gesture-related behaviors and minimize the number of questions from 48 to 30 for Part Three.

Eyerusalem Birhan.

19 January 2024.

### Version 1.6

Added revision date to cover page.

Part 1, Q2: changed “Woman” and “Man” to “Female” and “Male”.

Part 3, Q2: added “Nod head” option.

Part 3, Q3: added “Pass beside” option.

Part 3, Q7 - Q9: added “Muraho” and “Mwaramutse or Mwiriwe” options.

Part 3, Q21 - Q27: added “head” to question.

Part 3, Q28: added “hand” and “body” to question.

Part 3, Q29 & Q30: changed “would you not use” to “would you use” (to be consistent with other questions).

Removed References.

Added an appendix for a Kinyarwanda version of the questionnaire.

David Vernon.

2 February 2024.

**Version 1.7** Added content to appendix for the Kinyarwanda version of the questionnaire.

Eyerusalem Birhan.

23 February 2024.

**Version 1.8** Added links to the online questionnaire in Kinyarwanda and English.

David Vernon.

31 July 2024.

**Version 2.0** Added a section on the knowledge representation architecture suggested by Barbara Bruno et al. [1]. Revised the Cultural knowledge ontology in Appendix III to align it more closely with the parameters of the robot actions, as suggested in [1]. Added a section on mapping the questions in the survey to the ontology. Added a section on representing the knowledge derived from the questions in the survey using key-value pairs, with keys derived from the ontology. Added a provisional set of values for each key-value pair. Revised the abstract to reflect these changes.

David Vernon.

19 August 2024.