

# Empirical study on human evaluation of complex argumentation frameworks

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## Supplementary Material

This document provides the instructions, the examples, and the argumentation frameworks that were used in the conference paper by Cramer and Guillaume presented at JELIA 2019. There are 12 argumentation frameworks (AFs) for a total of 60 arguments. The argumentation frameworks are instantiated with natural language arguments, which are presented together with their graphical visualizations, just like in the questionnaires used in the study. The natural language arguments are labeled with a letter, which is used in the graphical visualizations and was given in the questionnaire as well, and additionally with the number (indicated in parenthesis) to which we refer in Figure 2 of the paper.

## Instruction

This questionnaire asks you to evaluate whether given arguments are to be accepted or to be rejected in a certain context. The context of all the arguments in this questionnaire is the following scenario, which we ask you to imagine:

You arrive at an island that is said to have multiple hidden treasures that you want to find. Luckily, many of the islanders know about where the treasures are hidden, and some of them are willing to help you. However, some of the islanders are trying to deceive you by giving you wrong information. You only have a limited amount of time for digging in search for treasures, so you want to make sure you make a good decision about where it is worth to look for a treasure and where it is not worth it.

The only way you can possibly find out about which islanders are trustworthy and which ones are not is by asking each islander about the trustworthiness of the other islanders. You decide to follow the principle that you trust an islander as long as you don't have a good reason to believe that this islander is not trustworthy.

First you go around asking islanders for information, and you take notes of which islander told you what. Furthermore, based on what the islanders tell you, you write down arguments for searching a treasure in certain places and for not trusting certain islanders. Once you have asked all islanders, you look back at the list of arguments that you have formulated.

Now your task is to decide which of these arguments you accept and which ones you reject. If there is no way to decide between accepting and rejecting an argument, you can also mark it as undecided. Please tick one box per argument (i.e. per line).

In order to help you understand the logical relations between the arguments, we also provide a graphical representation of the logical attacks between arguments. This is explained in more detail in the examples in the following sections.

## Example 1

**Argument A:** Islander Amy says that there is a treasure buried between the two tall palm trees. So we should dig up the sand between the two palm trees.

**Argument B:** Islander Berta says that islander Amy is not trustworthy and that there is a treasure buried behind the tower. So we should not trust what Amy says, and we should dig up the sand behind the tower.

Here argument B provides a reason to not trust Amy, and thus to reject argument A. So argument B can be used as a counterargument against argument A. Another way of saying this is to say that argument B attacks argument A.

Argument A, on the other hand, does not provide a reason to reject argument B, so argument A cannot be used as a counterargument against argument B. In this case we say that argument A does not attack argument B.

The logical relation between argument A and argument B can be depicted as follows:



The arrow from B to A means that argument B attacks argument A. Since argument A does not attack argument B, there is no arrow back from A to B.

Given the principle that you trust an islander as long as you don't have a good reason to believe that this islander is not trustworthy, you should accept argument B, since it is based on trusting islander Berta and you don't have any reasons to believe that Berta is not trustworthy. And given that you accept argument B, you have to reject argument A, since argument A is based on trusting islander Amy and argument B provides a good reason to believe that Amy is not trustworthy.

One can state the reasoning in the previous paragraph more simply as follows: Since no argument attacks argument B, argument B should be accepted. Since an argument that is accepted attacks argument A, argument A should be rejected.

To indicate the choice of rejecting argument A and accepting argument B, you should tick the boxes as follows:

	Accept	Undecided	Reject
Argument A	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Argument B	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Example 2

**Argument C:** Islander Claire says that islander Daniel is not trustworthy and that there is a treasure buried on the shore of the lake. So we should not trust what Daniel says, and we should dig up the sand on the shore of the lake.

**Argument D:** Islander Daniel says that islander Claire is not trustworthy and that there is a treasure buried next to the large rock. So we should not trust what Claire says, and we should dig up the sand next to the large rock.

Here argument C provides a reason to not trust Daniel, and thus to reject argument D. So argument C attacks argument D. Similarly, argument D provides a reason to reject argument C, i.e. argument D also attacks argument C. So graphically, the situation is as follows:

C  $\longleftrightarrow$  D

Since the two arguments are in conflict, we cannot accept both of them. But there is no reason to prefer one argument over the other, so we cannot decide which one to accept and which one to reject. For this reason, we consider both arguments as undecided.

To indicate that you consider both arguments undecided, you should tick the boxes as follows:

	Accept	Undecided	Reject
Argument C	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Argument D	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

### Example 3

**Argument E:** Islander Ernst says that there is a treasure buried between the two hills. So we should dig up the sand between the two hills.

**Argument F:** Islander Fiona says that there is a treasure buried behind the big rock. So we should dig up the sand behind the big rock.

There is no conflict between the information provided by the two arguments. In other words, neither argument attacks the other. This can be depicted graphically as follows:

E                    F

Here, there is no arrow between argument E and argument F, as neither of them attacks the other.

Since no reason is given to believe that either islander Ernst or islander Fred is not trustworthy, the principle that you trust an islander as long as you don't have a good reason to believe that this islander is not trustworthy implies that you should trust both Ernst and Fiona. Thus you should accept both arguments.

One can state this reasoning more simply as follows: Since no argument is attacked by any argument, we can accept both arguments.

To indicate that you accept both arguments, you should tick the boxes as follows:

	Accept	Undecided	Reject
Argument E	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Argument F	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Argumentation Framework 1

**Argument G (1):** Islander Greg says that islander Hans is not trustworthy and that there is a treasure buried in front of the well. So we should not trust what Hans says, and we should dig up the sand in front of the well.

**Argument H (2):** Islander Hans says that islander Irina is not trustworthy and that there is a treasure buried behind the bridge. So we should not trust what Irina says, and we should dig up the sand behind the bridge.

**Argument I (3):** Islander Irina says that there is a treasure buried near the northern tip of the island. So we should dig up the sand near the northern tip of the island.

**Argument J (4):** Islander Jenny says that there is a treasure buried near the southern tip of the island. So we should dig up the sand near the southern tip of the island.



## Argumentation Framework 2

**Argument T (5):** Islander Tina says that islander Umberto is not trustworthy and that there is a treasure buried between the olive trees. So we should not trust what Umberto says, and we should dig up the sand between the olive trees.

**Argument U (6):** Islander Umberto says that islander Tina and islander Victor are not trustworthy and that there is a treasure buried to the south of the swamp. So we should not trust what Tina and Victor say, and we should dig up the sand to the south of the swamp.

**Argument V (7):** Islander Victor says that there is a treasure buried to the north of the swamp. So we should dig up the sand to the north of the swamp.



## Argumentation Framework 3

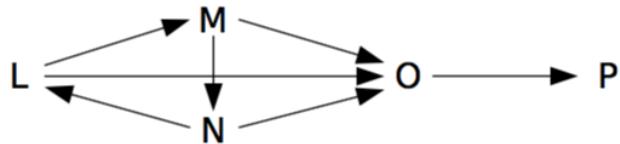
**Argument L (8):** Islander Lisa says that islander Mila and islander Olivia are not trustworthy and that there is a treasure buried on the peak of the mountain. So we should not trust what Mila and Olivia say, and we should dig up the sand on the peak of the mountain.

**Argument M (9):** Islander Mila says that islander Neil and islander Olivia are not trustworthy and that there is a treasure buried next to the old wall. So we should not trust what Neil and Olivia say, and we should dig up the sand next to the old wall.

**Argument N (10):** Islander Neil says that islander Lisa and islander Olivia are not trustworthy and that there is a treasure buried between the two oak trees. So we should not trust what Lisa and Olivia say, and we should dig up the sand between the two oak trees.

**Argument O (11):** Islander Olivia says that islander Peter is not trustworthy, and that there is a treasure buried near the eastern tip of the island. So we should not trust what Peter says, and we should dig up the sand near the eastern tip of the island.

**Argument P (12):** Islander Peter says that there is a treasure buried near the southern tip of the island. So we should dig up the sand near the southern tip of the island.



## Argumentation Framework 4

**Argument R (13):** Islander Ron says that islander Sarah is not trustworthy and that there is a treasure buried next to the harbor. So we should not trust what Sarah says, and we should dig up the sand next to the harbor.

**Argument S (14):** Islander Sarah says that islander Tom is not trustworthy and that there is a treasure buried north of the forest. So we should not trust what Tom says, and we should dig up the sand north of the forest.

**Argument T (15):** Islander Tom says that islander Ron, islander Sarah and islander Ursula are not trustworthy and that there is a treasure buried south of the forest. So we should not trust what Ron, Sarah and Ursula say, and we should dig up the sand south of the forest.

**Argument U (16):** Islander Ursula says that islander Vincent is not trustworthy, and that there is a treasure buried next to the old monument. So we should not trust what Vincent says, and we should dig up the sand next to the old monument.

**Argument V (17):** Islander Vincent says that there is a treasure buried next to the ruins. So we should dig up the sand next to the ruins.



## Argumentation Framework 5

**Argument W (18):** Islander Walter says that islander Xavier is not trustworthy and that there is a treasure buried between the ponds. So we should not trust what Xavier says, and we should dig up the sand between the ponds.

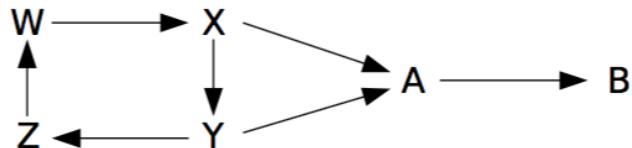
**Argument X (19):** Islander Xavier says that islander Yanis and islander Anna are not trustworthy and that there is a treasure buried next to the temple. So we should not trust what Yanis and Anna say, and we should dig up the sand next to the temple.

**Argument Y (20):** Islander Yanis says that islander Zoe and islander Anna are not trustworthy and that there is a treasure buried to the east of the lake. So we should not trust what Zoe and Anna say, and we should dig up the sand to the east of the lake.

**Argument Z (21):** Islander Zoe says that islander Walter is not trustworthy, and that there is a treasure buried between the two highest mountains. So we should not trust what Walter says, and we should dig up the sand between the two highest mountains.

**Argument A (22):** Islander Anna says that islander Bella is not trustworthy, and that there is a treasure buried to the west of the lake. So we should not trust what Bella says, and we should dig up the sand to the west of the lake.

**Argument B (23):** Islander Bella says that there is a treasure buried to the north of the lake. So we should dig up the sand to the north of the lake.



## Argumentation Framework 6

**Argument C (24):** Islander Charlie says that islander Dorothy is not trustworthy and that there is a treasure buried to the south of the high mountain. So we should not trust what Dorothy says, and we should dig up the sand to the south of the high mountain.

**Argument D (25):** Islander Dorothy says that islander Emma is not trustworthy and that there is a treasure buried to the west of the high mountain. So we should not trust what Emma says, and we should dig up the sand to the west of the high mountain.

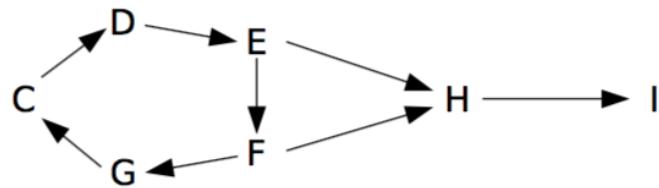
**Argument E (26):** Islander Emma says that islander Fred and islander Hannah are not trustworthy and that there is a treasure buried to the east of the high mountain. So we should not trust what Fred and Hannah say, and we should dig up the sand to the east of the high mountain.

**Argument F (27):** Islander Fred says that islander George and islander Hannah are not trustworthy, and that there is a treasure buried to the north of the high mountain. So we should not trust what George and Hannah say, and we should dig up the sand to the north of the high mountain.

**Argument G (28):** Islander George says that islander Charlie is not trustworthy, and that there is a treasure buried to the west of the village. So we should not trust what Charlie says, and we should dig up the sand to the west of the village.

**Argument H (29):** Islander Hannah says that islander Ivan is not trustworthy, and that there is a treasure buried to the south of the village. So we should not trust what Ivan says, and we should dig up the sand to the south of the village.

**Argument I (30):** Islander Ivan says that there is a treasure buried to the north of the village. So we should dig up the sand to the north of the village.



## Argumentation Framework 7

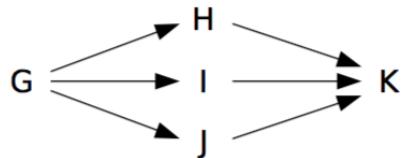
**Argument G (31):** Islander Greg says that islander Hans, islander Irina and islander Jenny are not trustworthy and that there is a treasure buried in front of the well. So we should not trust what Hans, Irina and Jenny say, and we should dig up the sand in front of the well.

**Argument H (32):** Islander Hans says that islander Ken is not trustworthy and that there is a treasure buried behind the bridge. So we should not trust what Ken says, and we should dig up the sand behind the bridge.

**Argument I (33):** Islander Irina says that islander Ken is not trustworthy and that there is a treasure buried near the northern tip of the island. So we should not trust what Ken says, and we should dig up the sand near the northern tip of the island.

**Argument J (34):** Islander Jenny says that islander Ken is not trustworthy and that there is a treasure buried near the southern tip of the island. So we should not trust what Ken says, and we should dig up the sand near the southern tip of the island.

**Argument K (35):** Islander Ken says that there is a treasure buried near the mouth of the river. So we should dig up the sand near the mouth of the river.



## Argumentation Framework 8

**Argument T (36):** Islander Tina says that islander Umberto is not trustworthy and that there is a treasure buried between the olive trees. So we should not trust what Umberto says, and we should dig up the sand between the olive trees.

**Argument U (37):** Islander Umberto says that islander Victor is not trustworthy and that there is a treasure buried to the south of the swamp. So we should not trust what Victor says, and we should dig up the sand to the south of the swamp.

**Argument V (38):** Islander Victor says that islander Umberto is not trustworthy and that there is a treasure buried to the north of the swamp. So we should not trust what Umberto says, and we should dig up the sand to the north of the swamp.



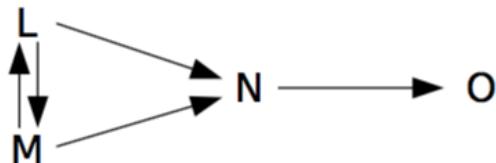
## Argumentation Framework 9

**Argument L (39):** Islander Lisa says that islander Mila and islander Neil are not trustworthy and that there is a treasure buried on the peak of the mountain. So we should not trust what Mila and Neil say, and we should dig up the sand on the peak of the mountain.

**Argument M (40):** Islander Mila says that islander Lisa and islander Neil are not trustworthy and that there is a treasure buried next to the old wall. So we should not trust what Lisa and Neil say, and we should dig up the sand next to the old wall.

**Argument N (41):** Islander Neil says that islander Olivia is not trustworthy and that there is a treasure buried between the two oak trees. So we should not trust what Olivia says, and we should dig up the sand between the two oak trees.

**Argument O (42):** Islander Olivia says that there is a treasure buried near the eastern tip of the island. So we should dig up the sand near the eastern tip of the island.



## Argumentation Framework 10

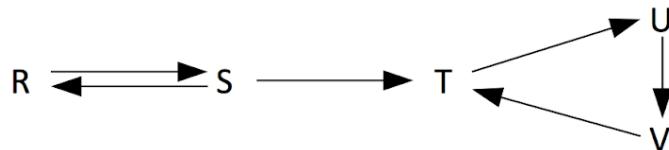
**Argument R (43):** Islander Ron says that islander Sarah is not trustworthy and that there is a treasure buried next to the harbor. So we should not trust what Sarah says, and we should dig up the sand next to the harbor.

**Argument S (44):** Islander Sarah says that islander Ron and islander Tom are not trustworthy and that there is a treasure buried north of the forest. So we should not trust what Ron and Tom say, and we should dig up the sand north of the forest.

**Argument T (45):** Islander Tom says that islander Ursula is not trustworthy and that there is a treasure buried south of the forest. So we should not trust what Ursula says, and we should dig up the sand south of the forest.

**Argument U (46):** Islander Ursula says that islander Vincent is not trustworthy, and that there is a treasure buried next to the old monument. So we should not trust what Vincent says, and we should dig up the sand next to the old monument.

**Argument V (47):** Islander Vincent says that islander Tom is not trustworthy and that there is a treasure buried next to the ruins. So we should not trust what Tom says, and we should dig up the sand next to the ruins.



## Argumentation Framework 11

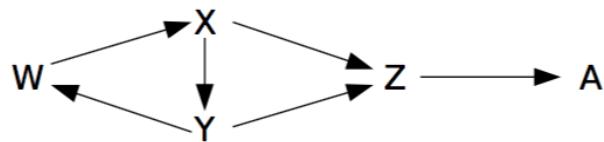
**Argument W (48):** Islander Walter says that islander Xavier is not trustworthy and that there is a treasure buried between the ponds. So we should not trust what Xavier says, and we should dig up the sand between the ponds.

**Argument X (49):** Islander Xavier says that islander Yanis and islander Zoe are not trustworthy and that there is a treasure buried next to the temple. So we should not trust what Yanis and Zoe say, and we should dig up the sand next to the temple.

**Argument Y (50):** Islander Yanis says that islander Walter and islander Zoe are not trustworthy and that there is a treasure buried to the east of the lake. So we should not trust what Walter and Zoe say, and we should dig up the sand to the east of the lake.

**Argument Z (51):** Islander Zoe says that islander Anna is not trustworthy, and that there is a treasure buried between the two highest mountains. So we should not trust what Anna says, and we should dig up the sand between the two highest mountains.

**Argument A (52):** Islander Anna says that there is a treasure buried to the west of the lake. So we should dig up the sand to the west of the lake.



## Argumentation Framework 12

**Argument C (53):** Islander Charlie says that islander Dorothy is not trustworthy and that there is a treasure buried to the south of the high mountain. So we should not trust what Dorothy says, and we should dig up the sand to the south of the high mountain.

**Argument D (54):** Islander Dorothy says that islander Emma is not trustworthy and that there is a treasure buried to the west of the high mountain. So we should not trust what Emma says, and we should dig up the sand to the west of the high mountain.

**Argument E (55):** Islander Emma says that islander Fred and islander Ivan are not trustworthy and that there is a treasure buried to the east of the high mountain. So we should not trust what Fred and Ivan say, and we should dig up the sand to the east of the high mountain.

**Argument F (56):** Islander Fred says that islander George and islander Ivan are not trustworthy, and that there is a treasure buried to the north of the high mountain. So we should not trust what George and Ivan say, and we should dig up the sand to the north of the high mountain.

**Argument G (57):** Islander George says that islander Hannah is not trustworthy, and that there is a treasure buried to the west of the village. So we should not trust what Hannah says, and we should dig up the sand to the west of the village.

**Argument H (58):** Islander Hannah says that islander Charlie is not trustworthy, and that there is a treasure buried to the east of the village. So we should not trust what Charlie says, and we should dig up the sand to the east of the village.

**Argument I (59):** Islander Ivan says that islander John is not trustworthy, and that there is a treasure buried to the south of the village. So we should not trust what John says, and we should dig up the sand to the south of the village.

**Argument J (60):** Islander John says that there is a treasure buried to the north of the village. So we should dig up the sand to the north of the village.

