Relation 7: Component - Whole

Preamble

This relation is based on the work of Winston, Chaffin, and Hermann (1987). They performed psycholinguistic experiments to identify part-whole instances based on the way in which the parts contribute to the structure of the wholes. They proposed six subcategories of Part-Whole: Component-Integral Object, Member-Collection, Portion-Mass, Stuff-Object, Feature-Activity and Place-Area.

Definition

Component-Whole (*X*,*Y*) is true for a sentence *S* that mentions entities *X* and *Y* if and only if:

(1) *S*, *X* and *Y* are in accordance with the general annotation guidelines:

http://docs.google.com/Doc?docid=dfhkmm46_0f63mfvf7

(2) the situation described in *S* entails that *X* is a component of *Y*;

(3) *X* has a functional relation with *Y*. In other words, *X* has an operating or usable purpose within *Y*.

Definition – Restrictions

(a) *Y* is a complete object that has a certain structure or organization.

(b) *Y* is a physical object, an abstract object or an organization.

(c) *X* and *Y* are not alike, they are not items of the same kind.

(d) *X* has a clear boundary and could, in principle, be separated from Y.

Note: restriction (d) is in contrast with the type of part-whole relations in which elements do not have clear boundaries such as the stuff-object relation (examples are: 'alcohol-wine' or 'silk-dress'.)

(e) People are never components.

Definition - Overlaps

The Component-Whole relation is closely related to Member-Collection. The main difference between these two relations is the functional aspect which is lacking in Member-Collection. In some cases the functional aspect may not be clear. Such ambiguous examples are excluded from our data set.

The Component-Whole relation may also overlap with Content-Container. In some cases it might not be clear whether an element is an integral part of another element or whether a functional relation holds between them.

Positive Examples

We don't need Einstein's quantum mechanics to understand why each <e1>hand</e1> has 5 <e2>fingers</e2>, and not 4 or 6.

Component-Whole(e2, e1)

Comment: *Fingers* are functional, integral parts of the hand.

"The index <e1>finger</e1> on my right <e2>hand</e2> *has* been numb for 3 days now, should I cut it off?"

Component-Whole(e1, e2)

Comment: This *finger* is a functional, integral part of the *hand*.

"So I tiptoed in my socks and stood looking through the <e1>spyhole<e1> in the <e2>door</e2>, trying not to breathe loudly while I tried to decide whether to let her in or not."

Component-Whole(e1, e2)

Comment: The *spyhole* is a functional, integral and separable part of the *door*.

"The <e1>workshop</e1> included a <e2>discussion</e2> on various documents in respect of exports, imports and documents relating to letters of credit."

Component-Whole(e2, e1)

Comment: The *discussion* is an integral and functional part of the *workshop*; it changes if we remove the discussion.

"The <e1>mouse</e1> some times, not very often, loses connection with your <e2>computer</e2> and sticks."

Component-Whole(e1, e2)

Comment: The *mouse* is a functional and separable part of the *computer*.

"Feel free to download the first <e1>chapter<e1> of the <e2>book</e2> (PDF - 78 kb) as free sample."

Component-Whole(e1, e2)

Comment: A *chapter* is an integral, functional and separable part of the *book*.

"<e1>Headlights</e1> are considered as the eyes of the <e2>vehicle</e2>."

Component-Whole(e1, e2)

Comment: *Headlights* are integral, functional and separable parts of the *vehicle*.

"Press and hold down the <e1>button<e1> on the <e2>pendant</e2> for 4 seconds. "

Component-Whole(e1, e2)

Comment: The *button* is an integral, functional and separable part of the *pendant*.

"Highlight <e1>cheeks</e1> with base lighter than that used on rest of the <e2>face</e2>."

Component-Whole(e1, e2)

Comment: *Cheeks* are an integral, functional part of the *face*.

Most wild trees, but also a lot of cultivated tree varieties, have <e1>blossoms</e1> with five <e2>petals<e2>.

Component-Whole(e2, e1)

Comment: This is a prototypical example of a Component-Whole relation.

Near-Miss Negative Examples

The <e1>Dean</e1> of the <e2>Faculty</2> is the Chief Academic Officer of the College."

Member-Collection(e1,e2)

Comment: The *dean* is a member of the *faculty*, *faculty* is a group of people an the dean is one of its members. The dean also clearly has a functional role in the faculty. However, persons can not be components.

"The <e1>theory</e1> contained many <e2>flaws</e2>."

Content-Container(e2, e1)

Comment: The flaws are "contained in" the theory in an abstract sense. We assume that the flaws can be eliminated and are not an integral part of the theory. We might also argue that flaws do not serve a purpose in the theory, do not have a functional relation with the theory, so we exclude Component-Whole.

"I put the <e1>earring</e1> to my <e2>ear</e2> and pressed a little."

Entity-Destination (e1,e2)

Comment: We consider examples involving motion verbs (e.g. "put", "remove", "run", "enter", etc) as positive for Entity-Destination.

"The <e1>donkey</e1> is well known for its <e2>stubbornness</e2>."

Other

Comment: 'stubbornness' is a characteric of the 'donkey', it is not a separable element.

"I know because night after night I put my <e1>finger<e1> in his <e2>hand</e2> and wait for it to wrap around me like a sea anemone. "

Entity-Destination (e1,e2)

Comment: We consider examples involving motion verbs (e.g. "put", "remove", "run", "enter", etc) as positive for Entity-Destination. Also, here the activity is repetitive.

"<e1>Beer</e1> with alcohol contains more <e2>energy</e2> per volume than beer without."

Other

Comment: e2 is a property of e1. The elements e1 and e2 cannot be separated.

"<e1>Failure</e1> is part of <e2>success</e2>."

Other

Comment: The element e1 does not comply with restriction (a), it is not a integral part of e2 and does not have a certain structure.

The <e1>bark<e1> of white willow contains <e2>salicin</e2>, which is a chemical similar to aspirin (acetylsalicylic acid).

Other

Comment: This is a prototypical example of a stuff-object relation. The element e2 has no clear boundaries.

"Also, hip-hop graffiti is chosen due to the style, method, and individuals that create these images, as these <e1>individuals</e1> also are a part of the middle-class American <e2>society</e2> that is confronted and affected by the presence of these images. "

Member-Collection(e1, e2)

Comment: This is an example of Member-Collection relation. *Society* is an abstract object, *individuals* are an integral part of the society but not a functional part.

"Two UA <e1>astronomers </e1> were part of a <e2>team</e2> that just succeeded in fine-tuning NICMOS, making it a far more powerful tool for high-precision "polarimetry.""

Member-Collection(e1, e2)

Comment: This is an example of Member-Collection relation.

"Pulling with all his might, Bruce broke off the <e1>handle</e1> of the <e2>drawer</e2>."

Entity-Origin(e1,e2)

Comment: In this particular context, the *handle* is no longer attached to the *drawer* and the component-whole relation is no longer applicable. As the context involves an action or movement, the relation Entity-Origin holds as the handle originates from the drawer.

References

Winston, M., Chaffin, R., Herrmann, D., A taxonomy of part-whole relations. Cognitive Science, 11:417-444, 1987.