**Segmenting**

**Segmenting Rationale**

The physical activity and verbal output of each subject was first segmented into units that could subsequently be coded. Segmenting occurred at at a lower level than the coding and requires minimal interpretation, unlike coding. A single segment contains multiple contiguous physical activity segments of the same type.

Physical activity descriptors were defined to have a similar level of atomicity. They were confined to the subjects’ use of their hands. There was not sufficient and consistent data of the subjects’ gaze to include that information. Note that connecting parts included a direct acquisition of a LEGO part without searching through parts.

The lower level physical activity descriptors will ultimately allow interpretive coding of EDP phase transitions in combination with verbal output segments.

**Segmenting Rules**

Verbal activity is segmented by the snippet or interaction. In other words, talk is segmented when there is a change of speaker. For longer subject text in a transcription, talk is broken into additional segments by long pauses (more than 2 seconds) or clear changes of topic at (Atman & Bursic, 1998; McFarland & Bailey, 2015).

Physical activity is transcribed by activity descriptors (shown in *italics*). When the physical activity changes, insert a new timestamp and descriptor. Descriptors are put in {}. Multiple contiguous instances of the same physical activity do not need to be segmented. Activities should last at least 1-2 seconds to be segmented.

* *no\_activity* - no activity with hands for more than 1 seconds. Also use if subject is absently moving or holding model or parts with no apparent purpose.
* *pointing* - pointing at a part, model, or drawing with hands, pencil, or other object. Pointing can be *acting* if it is used to demonstrate movement or the intended actions of a model rather than simple pointing.
* *gesturing* - acting out or demonstrating something with hands or other object without model. If gesturing involves model, use *moving*. If gesturing is not about the model or parts, use *no\_activity.*
* *searching* for parts - note that subject could be holding model while searching, searching is main activity. If less than 2 seconds, use *connecting.*
* *measuring* parts - includes counting holes and comparing one part to another. In some cases, subjects move parts close to another part, this is considered measuring. Includes counting or measuring with their drawing.
* *connecting* parts - includes getting parts quickly without searching, includes reconnecting parts that have fallen off. Includes rare cases where part is not actually connected, for example, getting and putting down a base plate. Includes disconnecting parts.
* *moving* model or parts - includes picking up model if it fell over, includes manipulating model or parts of model in some way to evaluate it or demonstrate it, includes touching model. If absently moving or holding model or parts, use *no\_activity.*
* *programming* -using computer to add or modify a program.
* *downloading* program - including connecting USB cable, NXT only; WeDo programs are not downloaded.
* *starting* robot - includes finding correct program.
* *stopping* robot
* *drawing* - drawing a plan for or drawing a post-make artifact of a model.

Transcribing (segmenting) of physical activity and talk is independent. If change of physical activity occurs at the same time as a verbal segment, put physical activity descriptors after timestamp. Otherwise, put physical activity timestamps and descriptors after verbal segments if they overlap (but not exactly).