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English norming data for 423 short animated action movie clips

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Abstract

We present a set of 423 animated action movie clips of 3s, that we expect to be useful for a variety of experimental paradigms in which sentences are elicited. The clips either depict an action involving only an agent (intransitive action, e.g., a policeman that is sleeping), an action involving an agent and a patient (transitive action, e.g., a policeman shooting a pirate), or an action involving an agent, an object, and a beneficiary (ditransitive action, e.g., a policeman showing a hat to a pirate). In order to verify that the movie clips (when presented with a verb) indeed elicit intransitive, transitive, or ditransitive sentences, we conducted a written norming study with native speakers of American English. We asked 203 participants to describe the clips with a sentence using a given verb. The movie clips elicited valid responses in 90% of the cases. Moreover, there was an active response bias for the transitives, and a prepositional object dative (PO-dative) response bias for the ditransitives. This bias differed between verbs in the ditransitives. A list is provided with all clips and the proportion of each response type for each clip. The clips are stored as MP4-files and can be freely downloaded.

Keywords: action movie clips; stimulus set; norming data

One of the limitations that many researchers in psycholinguistics encounter when setting up an experiment involving the processing of action, is the static nature of the visual stimuli that they plan to use. Most of the visual materials that represent actions, consist of pictures (e.g., Akinina et al., 2015; Khwaileh, Mustafawi, Herbert, & Howard, 2018; Schwitter, Boyer, Méot, Bonin, & Laganaro, 2004; Shao, Roelofs, & Meyer, 2013), which can be hard to interpret. In particular, the inherent temporal and motion aspect of action is not present in such a picture. Capturing motion by means of movie clips might be a more ecologically valid solution. Some psycholinguistic studies use so-called motion events, consisting of clip art animations in which agents perform simple actions (Allen et al., 2007; Bunger, Papafragou, & Trueswell, 2013; Talmy, 1985; 2000). However, the stimulus sets that are used in these studies tend to be very small (e.g., 31 clips in Bunger et al.'s 2013 study; 10 clips in Allen et al.'s 2007 study). In addition, there are a few studies that used live action or stop motion movie clips with dolls, teddy bears, and other toys (e.g., Gertner, Fisher, & Eisengart, 2006; Thothathiri, Evans, & Poudel, 2017; Wonnacott, Newport, & Tanenhaus, 2008) or with real humans and objects (e.g., den Ouden, Fix, Parrish, & Thompson, 2009), but the creation of such clips is often very time-consuming and difficult to standardize. Finally, there are some studies with young children that used animated action movies (e.g., Ambridge, Pine, Rowland, & Young, 2008; Hsu, 2018; Peter, Chang, Pine, Blything, & Rowland, 2015; Rowland, Chang, Ambridge, Pine, & Lieven, 2012), although in these studies the number of movies is again rather limited.

Here we present a set of 423 short animated action movie clips with a duration of 3 seconds. All clips are standardized in the sense that the agents perform the actions in a similar way against an identical background in the same time window. The depicted actions are either intransitive (i.e., involving only an agent), transitive (i.e., involving an agent and a patient), or ditransitive (i.e. involving an agent, an object, and a beneficiary). The clips can be freely downloaded from the following link: https://osf.io/4awyu, where they are stored in MP4-format (size around 300 kB on average).

This stimulus set can be used in various domains, particularly in domains in which sentences are elicited or actions are observed. This includes, for example, language pathology (action descriptions are often included in neuropsychological test batteries, e.g., the Boston Diagnostic Aphasia Examination, BDAE; Goodglass, Kaplan, & Barresi, 2001), first language acquisition (e.g., Rispoli, 2003), second language acquisition (e.g., Cadierno & Lund, 2004), online visual processing of actions (e.g., Webb, Knott, & MacAskill, 2010), as well as language production (e.g., Bock, 1996) and comprehension research (e.g., Tremblay & Small, 2011). In general, they are very suitable to elicit sentence production in any modality, but they can also be used in studies on language comprehension (e.g., by asking participants to match a sentence to one of two clips). Because the clips are simple, and easy to interpret, they can also be used in studies that involve children (the movement might also capture their attention to a higher extent), elderly people, and clinical populations (also because the action is actually happening and does not have to be inferred from a static picture). Below, we provide three examples of studies that might benefit from the movie clips.

First, the clips can be used to investigate how learners acquire a new language. Sometimes, it might be interesting to teach the learners a language without using translations, for instance when the learners have different language backgrounds (but nevertheless need to be compared, e.g., Grey, Sanz, Morgan-Short, & Ullman, 2018), or in order to overcome direct mapping from the new vocabulary and grammar to their equivalents in the native language (e.g., Muylle, Bernolet, & Hartsuiker, submitted; Wonnacott et al., 2008). In order to acquire the language without translations, the meaning of the sentences that are learned can be conveyed through pictures (e.g., Culbertson & Newport, 2015; Fehér, Wonnacott, & Smith, 2016), and especially movies (e.g., Ambridge et al., 2008; Peter et al., 2015; Wonnacott et al., 2008). The movie clips that are presented here can be very useful in this regard, given that they depict actions more directly and completely than pictures, which are intrinsically static. In addition, the stimulus set has the advantage that it has many different verb-referents combinations, which allows language learning researchers to repeatedly present constructions with the same verb, while avoiding any other lexical/semantic overlap (this might also be useful for studying cumulative priming effects, see Jaeger & Snider, 2013; Kaschak, 2007).

Another example is the use of the clips to study the online processing of visual information in actions by means of eye-tracking or neuroimaging techniques. Griffin and Bock (2000) investigated fixations on agents and patients in static pictures of transitive actions during action description and found a tight link between the content of utterances and fixations preceding those utterances. It would be interesting to see whether similar results can be obtained with action movie clips, in which agents and patients are moving during the actions. Several studies use either real-life actions (Flanagan & Johansson, 2003) or video recordings of such actions (Webb et al., 2010) to investigate action perception. However, it is very hard to control for visual differences between such stimuli. Our clips are standardized regarding duration, position, and color of the scene, which allows for direct comparison between the eye-tracking or neuroimaging data that are acquired while subjects watch these clips. For instance, it can be investigated how brain-damaged patients (e.g., patients with neglect, Heilman, Valenstein, & Watson, 1985) observe these actions compared to healthy subjects.

Finally, the use of transitive and ditransitive actions implies that, for instance in English, there are at least two ways in which a sentence that describes these actions can be formulated: an active (e.g., "the clown is kissing the cook") vs. a passive sentence (e.g., "the cook is being kissed by the clown") for the transitives, and a prepositional object (PO) dative (e.g., "the waitress gives the hat to the witch") vs. a double object (DO) dative (e.g., "the waitress gives the witch the hat") for the ditransitives. Spontaneous descriptions can elucidate which structure is preferred for a specific action, whereas exposing subjects to prime sentences before they produce a description could alter these preferences. The tendency of speakers to persist in the use of structures that they have been recently exposed to is often called structural priming (Bock, 1986), a phenomenon that has been mostly investigated with picture descriptions and sentence completions (see Mahowald, James, Futrell, & Gibson, 2016, for a meta-analysis of more than 70 studies). Although a few previous studies have used action movie clips as target stimuli in structural priming (e.g., Rowland, Chang, Ambridge, Pine, & Lieven, 2012), most studies used static images, typically of transitive and ditransitive actions (with intransitive fillers). What is more, a large number of studies used variants of just two picture sets: the set used by Bock (1986) and the set used by Branigan, Pickering, and Cleland (2000). Using the movie clips that are presented here taps into action description in a more ecologically valid way (given that speakers in real life are more likely to describe actions rather than static images of actions), and also generalizes the phenomenon to a new stimulus set with the fundamentally different property that the actions unfold in time.

The abovementioned examples are only a sample of research domains that might benefit from the use of standardized action movies. In order to provide a measure for the clarity of each movie clip and its aptitude for action description, native speakers of English, residing in the USA, were asked to write down a sentence to describe the clip using a specific verb. Moreover, the sentences that were used can also indicate whether there are differences in structural preferences for the individual clips.

Methods

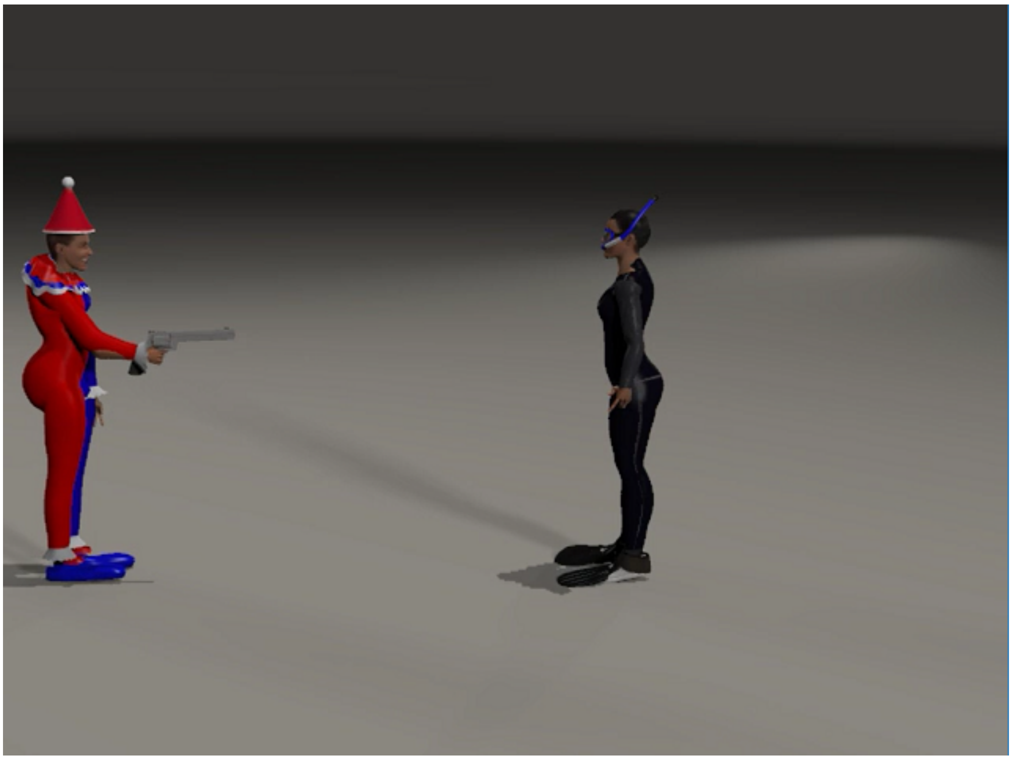
Participants

Two-hundred-and-three participants (119 males and 84 females; aged between 19-70 years old, $M = 36$, $SD = 11$) took part in this study. They were recruited on Amazon Mechanical Turk and received a financial compensation of five dollars for their participation. We imposed the restrictions that the respondents were native speakers of English and resided in the USA when filling out the survey. Participants were prevented from taking part twice by checking whether an IP address appeared more than once in the list. The IP addresses were removed from the dataset once all participants had completed the task.

Stimuli & design

We designed 423 action movie clips with a duration of 3 seconds created in Poser 11 3D animation software (Smith Micro®, 2015). The actions were depicted against a grey background (see Figure 1 for a movie still example). A list of all clips can be found in the online appendix (https://osf.io/4awyu). There were four intransitive actions (i.e. jump, run, sleep, and wave), four transitive actions, (i.e. kiss, punch, shoot, and tickle), and four ditransitive actions, (i.e. deliver, give, sell, and show). The agents (and human patients) of these actions could be one out of 18 human figures, mostly referring to a profession (e.g., cook, dancer, policeman) and the objects (in the ditransitive actions) could be one out of four objects (i.e. ball, book, cup, or hat). The clips were randomly divided into 10 lists of 42 or 43 items with a more or less balanced distribution of verbs. Within a list, half of the clips were mirrored to test whether the position of the elements taking part in the action had an effect on structural choices; for instance, one clip showed a clown on the left shooting down a swimmer on the right, and the mirrored version showed the swimmer on the left being shot by a clown on the right). In addition, a mirrored version of each list was created to balance mirroring of movie clips across lists. Hence, there were 20 different lists in total, each presented to (at least) 10 participants, who were randomly assigned to these lists. Thus, each clip was seen by at least 10 participants.

Figure 1. *Still from the movie clip "clownShootSwimmer".*



Procedure

The participants filled in a questionnaire, which started with questions asking for demographical information: gender, age, nationality, country of birth, country of residence, state of birth, education level, and finally there were several questions about the participants' language background. First, the participants indicated whether English was their native language (yes/no). If the answer was no, the survey ended with the message that the participant did not fulfill the requirements to take part in this study. In the other case, the survey continued with the question whether the participant was bilingual/multilingual. If so, they needed to specify which languages they spoke besides English, at which age they learned these languages, and how proficient they considered themselves to be (awareness, basic, intermediate, advanced, or expert). The last question was which variety of English (American, Australian, British, Canadian, Irish, Scottish, or other) was spoken by the participant.[1] Monolingual participants were directly redirected to this question.

[1] One person indicated to speak Australian English, and two people spoke British English. All the others were native speakers of American English. In total, 17 participants knew more than one language and only six of them learned a second language before the age of six. See "Subject.csv" on https://osf.io/4awyu

Next, in a familiarization phase, the participants were shown pictures of human figures and objects that would appear later on in the action movie clips. These were presented in the center of the screen (picture format: 644 x 400) accompanied with their English name printed below in bold (font: Verdana, 20 pt, black). An example of a picture can be found in Figure 2. The participants were asked simply to watch the picture trying to remember the English name and to press the 'Next' button to continue to the next picture[2]. The goal of this part was not only to familiarize the participants with the figures and objects, but also to reduce the variation in the names that they would use in the sentences.

Figure 2. *Example of a picture ("swimmer") that was used in the second part of the survey.*

Next, in the main phase of the test, the participants saw an action movie clip (size: 640 x 480) in the center of the screen with a verb printed in bold below (font: Verdana, 20 pt, black). They were instructed to describe the clip with a sentence containing the presented verb by typing the answer in a text box at the bottom of the screen. There was a possibility to replay the clip, if desired. After completion of the sentence, the participants pressed the 'Next' button to continue with a new movie clip. Each participant described 42 or 43 clips (depending on the list that they were assigned to). At the end of the survey, there was some space for participants to write down comments about the questionnaire. Most comments were related to technical issues (e.g., the movie was not loading) or to participants' performance on the task.

[2]One of the figures was originally designated as "indian", but given that this term is often considered to be offensive, we decided to change the term to "native American" afterwards.

Coding of responses

In general, sentences that did not contain all phrasal constituents that were expected, based on the valence of the target verb, were coded as *other* (e.g., "the clown sold the hat", which doesn't include the beneficiary of the action). Sentences had to contain a verbal form of the target verb (e.g., "the cook went out for a run" was coded as *other*, because "run" is a noun in this sentence) to be coded as a valid response (i.e. *intransitive*, *active*, *passive*, *DO*, *PO*), irrespective of the tense that was used. When participants chose another name for the human figures/objects (e.g., "scuba diver" instead of "swimmer") or replaced them with a pronoun (e.g., "he waves"), this had no influence on the scoring, because the structural choice was of primary interest here. The responses to intransitive movie clips were still coded as *intransitive* when aspectual forms were used (e.g., "the teacher stands waving") or when the target verb infinitive was combined with another verb (e.g., "the boxer had to run" or "the waitress likes to run"). Responses to transitive movie clips were coded as *active* or *passive* when the sentence had an active/passive counterpart (e.g., "the dancer likes to punch the witch" cannot be formulated in a passive way, and hence was coded as *other*). For ditransitives, a similar reasoning was used to code the responses as *DO* or *PO*. In addition, it was allowed to switch the human agent and patient with the verb *sell*, because these were very easily confused, without hampering the *DO* or *PO* formulation of the sentence. Furthermore, trials in which the clip did not load were excluded from the analysis.

Results

The proportion of different responses for each movie clip can be found online in Appendix A (https://osf.io/4awyu). For the intransitive movie clips, 95.3% of the responses were marked as *intransitive*. The transitive clips elicited 89.1% active responses, 0.6% passive responses, and 10.3% other responses, whereas there were 63.9% PO responses, 24.9% DO responses, and 11.1% other responses for the ditransitive clips. Other responses were not taken into account for any of the statistical tests reported below.

Hence, the active response bias (active responses/ (active + passive responses)) was 99.3% and the PO response bias (PO responses/ (PO + DO responses)) was 72.0%.

Verb biases

Structural preferences for transitive and ditransitive verbs are reported in Table 1. In order to test whether there were significant differences between verbs, generalized linear mixed effects models (logit link-function) were fitted for transitives and ditransitives using the lme4 package (Bates, Maechler, Bolker, & Walker, 2015) in R (R Core Team, 2016). The models had *verb* as fixed effect, *participant* as random intercept, and a random slope of *verb* over participants. For the transitives, the outcome variable was *active response* (0 or 1) and for the ditransitives, it was *PO response*.

Due to the small number of passive observations, the transitive model failed to converge with singularity issues. Hence, *verb* was removed as random slope from the model. The new model's output showed a significant effect of *verb* ($\chi^2(3) = 12.23$, $p = .007$). Post-hoc pairwise comparisons using the 'emmeans' package (Lenth, 2019) revealed a significant difference between *kiss* and *tickle* ($Z = 3.08$, $p = .011$). All other contrasts between verbs were not significant.

In contrast to the transitive model, the ditransitive model did converge and showed a significant effect of *verb* ($\chi^2(3) = 96.92$, $p < .001$). Pairwise contrasts revealed significant differences in all verb pairs (*deliver-give*: $Z = 14.05$, $p < .001$; *deliver-sell*: $Z = 9.42$, $p < .001$; *deliver-show*: $Z = 15.17$, $p < .001$; *give-sell*: $Z = -10.98$, $p < .001$; *sell-show*: $Z = 13.20$, $p < .001$), except for the pair *give-show* ($Z = 2.37$, $p = 0.08$).

Table 1. *Proportion of different responses for each verb.*

	verb	active	passive
transitives	kiss	1.00	0.00
	punch	1.00	0.00
	shoot	0.99	0.01
	tickle	0.98	0.02
	verb	PO	DO
ditransitives	deliver	0.96	0.04
	give	0.61	0.39
	sell	0.80	0.20
	show	0.57	0.43

Biases in the depicted action direction

When the action was depicted from left to right, 99.4% of the responses to transitive movie clips were active and 72.2% of the responses to ditransitive clips were PO. For the mirrored clips (i.e. action from right to left), there were 99.2% active responses and 71.7% PO responses. Similar models were built as with the verbs, but *verb* was now replaced with *mirrored* (0 or 1). The output of both transitive and ditransitive models showed that the direction of the action had no influence on the active and PO biases (transitive: $\chi^2(1) = 0.05$, $p = .82$; ditransitive: $\chi^2(1) = 0.35$, $p = .55$).

Age, gender, and education level biases

A transitive and ditransitive model were fitted with a fixed effect for *age* and a random intercept for *participant* to test whether there were age differences in the bias. No effect of age was found for any of the structures (transitive: $\chi^2(1) = 0.01$, $p = .93$; ditransitive: $\chi^2(1) = 0.29$, $p = .59$). The same analyses were done for *gender* and *education level*, showing no effect for any of these factors (all p's > .3).

Regional differences in biases

The participants originated from 39 different states in the USA. Four participants were born outside of the USA and were not taken into account for this analysis. In order to test for regional differences in structural preferences, the states were grouped into West, Midwest, Southwest, Northeast, and Southeast. The bias per region can be found in Table 2. Generalized mixed effects models with *region* as fixed effect and *participant* as random intercept showed that there were no differences between regions (transitives: $\chi^2(4) = 0.42$, $p = .98$; ditransitives: $\chi^2(4) = 5.56$, $p = .23$).

Table 2. Proportion of responses for each region.

	transitives		ditransitives	
region (N of participants)	active	passive	PO	DO
Midwest (38)	0.99	0.01	0.66	0.34
Northeast (60)	0.99	0.01	0.74	0.26
Southeast (58)	1.00	0.00	0.70	0.30
Southwest (19)	0.99	0.01	0.78	0.22
West (23)	1.00	0.00	0.73	0.27

Discussion

The goal of this study was to provide written norms for 423 short animated action movie clips by asking 203 native speakers of American English to write down a sentence describing these clips with a given verb. This resulted in over 90% valid responses in which a transitive, ditransitive, or intransitive sentence was used. In addition, there were no major differences between the movie clips in the elicitation of 'other' responses (i.e., none of the clips elicited an unacceptable large number of 'other' responses), which indicates that our stimulus set evokes the presumed sentence structures. As such, we showed that the clips are suitable for (at least written) experimental studies.

Overall, there was a very strong active response bias (99%) for the transitives, and a weaker PO response bias (72%) for the ditransitives. The strong active bias is similar to what is typically observed in English spoken production (i.e., the ratio of actives vs. passives is 99 to 1, Bates & Devescovi, 1989) and is probably due to the fact that both agent and patient were always animate (Ferreira, 1994). In addition, the active and PO biases did not differ across age, gender, education level, US region, or direction of action (left to right vs. right to left). The absence of an effect of action direction is in contrast with picture description studies, which typically find an increase in the production of passive sentences when the picture involves a right-to-left action compared to a left-to-right one (e.g., Bock, 1986). An explanation for this difference could be that participants tend to interpret pictures from left to right (at least for cultures that have a left-to-right writing system), whereas in movies they follow the action movement.

For the transitives, the active bias was equally strong in all verbs (i.e. *kiss*, *punch*, and *shoot*) – although *tickle* elicited slightly more passives – whereas for the ditransitives, the PO bias differed across verbs. The strongest PO bias was observed for the verb *deliver* (96%); it was slightly weaker for the verb *sell* (80%), and the weakest for the verbs *give* and *show* (both around 60%). One explanation for these differences can be found in the idea that when the stress of the action is on the motion (e.g., *send*, *deliver*, and *throw*), there will be a strong PO bias, but when the stress is on possession (e.g., *give, sell* and *show*), there will be a strong DO bias (e.g., Goldberg, 1995; Pinker, 1989; Rappaport Hovav & Levin, 2008). This theoretical concept can account for the finding that *deliver* appears almost exclusively with a PO dative, but does not explain why there would be a stronger PO bias for *sell* compared to *give* and *show* (in which the stress is mainly on possession).

Surprisingly, the current study found a strong PO bias in general, whereas corpus studies usually find a strong DO bias in American English (e.g., Bresnan & Hay, 2008; Szmrecsányi et al., 2017; Wolk, Bresnan, Rosenbach, & Szmrecsányi, 2013). In her 1986 study, using picture descriptions in American English, Bock found no specific baseline preference for PO or DO datives. An explanation for this difference might be that corpus studies contain all kinds of (spoken or written) utterances, that very often involve pronouns, e.g., “give me the money”, which are known to have a strong influence on the preferred structure (Bresnan, Cueni, Nikitina, & Baayen, 2007), in the sense that the choice is determined by the length of the constituents. For instance, when the direct object is the shortest, there is a PO bias (e.g., “she gave it to the lady”), but when the direct object is the shortest, there is a DO bias (e.g., “she gave her a candle”). In addition, verbs in picture description studies are often very concrete in nature (i.e. the meaning is conveyable through a picture), e.g., *give* and *sell* can be easily depicted, whereas *teach* and *tell* are very hard to put into an image. This last type of verb focuses less on motion, and hence tends to have a stronger DO bias (e.g., Goldberg, 1995; Pinker, 1989). Moreover, the corpora contain a wider range of ditransitive verbs, including communicative verbs (e.g., *tell*, *ask*, *read*) and verbs of future having (e.g., *offer*, *promise*, *allow*, *grant*), which both tend to have a strong DO bias (Rappaport Hovav & Levin, 2008). A similar contradiction in structural preferences has been found between corpora of written Dutch (Colleman, 2009), which show a DO bias, and Dutch picture description studies, that typically find a PO bias (Colleman & Bernolet, 2012). The current results indicate that this might also be the case for American English.

Bock (1986) might not have found a DO bias, in contrast to corpus studies, but neither did she find a PO bias, as we found here. One important difference between pictures and movies is that the latter have an intrinsic motion component and hence might elicit a stronger PO bias (e.g., Goldberg, 1995; Pinker, 1989; Rappaport Hovav & Levin, 2008), whereas this is not the case for pictures. In other words, the beneficiary of the ditransitive verbs in the movie clips can often also be seen as the destination or a locative (Ziegler & Snedeker, 2018), in which case sentences tend to have a prepositional structure (e.g., "the clown moves the ball to the cook"). All the above-mentioned factors might contribute to the PO bias in our dataset.

Although our set of movie clips is large, it is still limited in that not all verbs were exhaustively combined with all agents, patients, and recipients. However, for each intransitive verb there are at least ten clips and for the other verbs there are considerably more. Alternatively, we encourage other researchers to extend the stimulus set with other combinations and actions, according to their needs. To facilitate this, we made the action paths and movie building blocks in Poser available on the Open Science Framework (https://osf.io/4awyu).[3]

Because the norms provided in this study are based on written responses, caution is needed when relying on them for designs with spoken utterances. Indeed, spoken responses might show a different distribution for a certain structure than written ones. For instance, because passive responses take longer to write and writing is more effortful than speaking (see Kellogg, 1994), it could be the case that the preference for actives is stronger in written compared to spoken production (although the active bias in our written study is the same as the one reported in spoken studies). On the other hand, passives are more widely used in written language, as illustrated by corpus studies (e.g., Biber, 1993; Chafe, 1982; Roland, Dick, & Elman, 2007).These and other differences between speech and writing indicate that the results that we obtained here do not necessarily extend to spoken responses.

Furthermore, the specific choices we made with regard to the design (i.e., a familiarization phase and presentation of the verb underneath the movie) restrict the generalizability of the norms in the sense that changing one of the design parameters would probably yield different results (Roland & Jurafsky, 2002). Here, we chose to maximize the likelihood of producing one of the target structures by offering the target verb to participants and making them familiar with the characters and objects. A similar strategy is often used in structural priming studies, where it is very important to reduce the 'other' responses as much as possible (e.g., Bernolet, Hartsuiker, & Pickering, 2009; Cai, Pickering, Yan, & Branigan, 2011; Schoonbaert, Hartsuiker, & Pickering, 2007).

[3] A path for the verb *throw* is also included. We did not further develop this action, because this verb has no dative alternation in Dutch, which is the language that we use most in our studies.

In sum, our study shows that the movie clips are clear in terms of their content and that people tend to use the targeted structures when describing them. At least for written production, the results are relatively stable regarding structural preferences in movie descriptions.

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Open Practices Statement

All data and scripts that were used for analysis, along with the movie materials, are available on the Open Science Framework (https://osf.io/4awyu/?view_only=ce980af7143c435cbad80 30adc678d7a). This study has not been preregistered.

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Appendix

Note: The data reported below are also available in spreadsheet format on the Open Science Framework, which will enable researchers to sort and filter these data according to their wishes.

Appendix A. *List of movie clips, sorted by verb and number of valid responses, accompanied with proportions of response types.*

A) Intransitive

Verb	Movie clip	Valid responses
Jump		**0.93**
	boxerJump	1.00
	nativeAmericanJump	0.95
	monkJump	0.95
	pirateJump	0.95
	policemanJump	0.95
	sailorJump	0.95
	swimmerJump	0.95
	witchJump	0.95
	nunJump	0.90
	teacherJump	0.90
	cowboyJump	0.88
	clownJump	0.86
Run		**0.96**
	bodyguardRun	1.00
	boxerRun	1.00
	dancerRun	1.00
	knightRun	1.00
	monkRun	1.00
	clownRun	0.95
	cookRun	0.95
	cowboyRun	0.95
	doctorRun	0.95
	policemanRun	0.95
	swimmerRun	0.95
	teacherRun	0.95
	waitressRun	0.95
	witchRun	0.95
	sailorRun	0.90
Sleep		**0.96**
	cowboySleep	1.00
	monkSleep	1.00
	pirateSleep	1.00
	sailorSleep	1.00
	doctorSleep	0.95
	nunSleep	0.95

Verb	Movie clip	Valid responses
	waitressSleep	0.95
	boxerSleep	0.90
	knightSleep	0.90
	witchSleep	0.90
Wave		**0.96**
	nativeAmericanWave	1.00
	knightWave	1.00
	monkWave	1.00
	policemanWave	1.00
	sailorWave	1.00
	teacherWave	1.00
	clownWave	0.95
	dancerWave	0.95
	swimmerWave	0.95
	waitressWave	0.95
	cookWave	0.90
	pirateWave	0.90
	bodyguardWave	0.86

B) Transitive

Verb	Movie clip	Active	Passive	Other
Kiss		**0.86**	**0.002**	**0.14**
	clownKissTeacher	1.00	0.00	0.00
	cookKissWitch	1.00	0.00	0.00
	pirateKissWaitress	1.00	0.00	0.00
	policemanKissTeacher	1.00	0.00	0.00
	bodyguardKissMonk	0.95	0.00	0.05
	bodyguardKissSwimmer	0.95	0.00	0.05
	cookKissDancer	0.95	0.00	0.05
	cookKissSwimmer	0.95	0.00	0.05
	dancerKissBoxer	0.95	0.00	0.05
	knightKissClown	0.95	0.00	0.05
	monkKissPoliceman	0.95	0.00	0.05
	sailorKissWaitress	0.95	0.00	0.05
	waitressKissTeacher	0.95	0.00	0.05
	boxerKissCowboy	0.90	0.00	0.10
	clownKissPirate	0.90	0.00	0.10
	cookKissBoxer	0.90	0.00	0.10
	cowboyKissClown	0.90	0.00	0.10
	dancerKissCook	0.90	0.00	0.10
	pirateKissKnight	0.90	0.00	0.10
	pirateKissNun	0.90	0.00	0.10
	pirateKissPoliceman	0.90	0.00	0.10

Verb	Movie clip	Active	Passive	Other
	policemanKissClown	0.90	0.00	0.10
	policemanKissPirate	0.90	0.00	0.10
	bodyguardKissWaitress	0.86	0.00	0.14
	teacherKissPoliceman	0.86	0.00	0.14
	bodyguardKissTeacher	0.81	0.05	0.14
	boxerKissTeacher	0.85	0.00	0.15
	clownKissNun	0.85	0.00	0.15
	cookKissPirate	0.85	0.00	0.15
	cookKissTeacher	0.85	0.00	0.15
	doctorKissNativeAmerican	0.85	0.00	0.15
	nativeAmericanKissBoxer	0.85	0.00	0.15
	pirateKissClown	0.85	0.00	0.15
	pirateKissCook	0.85	0.00	0.15
	swimmerKissWaitress	0.85	0.00	0.15
	teacherKissSailor	0.85	0.00	0.15
	cowboyKissDancer	0.81	0.00	0.19
	monkKissPirate	0.81	0.00	0.19
	swimmerKissSailor	0.81	0.00	0.19
	teacherKissBoxer	0.81	0.00	0.19
	bodyguardKissKnight	0.80	0.00	0.20
	clownKissCook	0.80	0.00	0.20
	cookKissSailor	0.80	0.00	0.20
	knightKissSailor	0.80	0.00	0.20
	nunKissPirate	0.80	0.00	0.20
	policemanKissBoxer	0.80	0.00	0.20
	teacherKissClown	0.80	0.00	0.20
	teacherKissCook	0.80	0.00	0.20
	teacherKissPirate	0.80	0.00	0.20
	waitressKissPirate	0.80	0.00	0.20
	monkKissBodyguard	0.76	0.00	0.24
	clownKissPoliceman	0.71	0.05	0.24
	clownKissKnight	0.75	0.00	0.25
	clownKissSwimmer	0.75	0.00	0.25
	teacherKissBodyguard	0.75	0.00	0.25
	knightKissPoliceman	0.71	0.00	0.29
	sailorKissTeacher	0.70	0.00	0.30
Punch		**0.89**	**0.004**	**0.11**
	boxerPunchDancer	1.00	0.00	0.00
	monkPunchPirate	1.00	0.00	0.00
	nunPunchSailor	1.00	0.00	0.00
	policemanPunchNun	1.00	0.00	0.00
	bodyguardPunchCook	0.95	0.00	0.05

Verb	Movie clip	Active	Passive	Other
	boxerPunchWitch	0.95	0.00	0.05
	cowboyPunchMonk	0.95	0.00	0.05
	doctorPunchWaitress	0.95	0.00	0.05
	boxerPunchSailor	0.94	0.00	0.06
	cookPunchCowboy	0.90	0.00	0.10
	cowboyPunchNun	0.90	0.00	0.10
	cowboyPunchPoliceman	0.90	0.00	0.10
	cowboyPunchSailor	0.90	0.00	0.10
	dancerPunchCowboy	0.90	0.00	0.10
	nativeAmericanPunchTeacher	0.90	0.00	0.10
	sailorPunchClown	0.90	0.00	0.10
	sailorPunchCowboy	0.90	0.00	0.10
	waitressPunchPirate	0.90	0.00	0.10
	witchPunchSwimmer	0.90	0.00	0.10
	witchPunchWaitress	0.90	0.00	0.10
	piratePunchPoliceman	0.85	0.05	0.10
	policemanPunchCowboy	0.89	0.00	0.11
	dancerPunchWitch	0.88	0.00	0.13
	monkPunchSailor	0.86	0.00	0.14
	swimmerPunchPirate	0.81	0.05	0.14
	cowboyPunchDancer	0.85	0.00	0.15
	nunPunchCowboy	0.85	0.00	0.15
	policemanPunchWitch	0.85	0.00	0.15
	teacherPunchMonk	0.85	0.00	0.15
	waitressPunchWitch	0.85	0.00	0.15
	piratePunchMonk	0.76	0.05	0.19
	dancerPunchBoxer	0.80	0.00	0.20
	nunPunchMonk	0.80	0.00	0.20
	piratePunchSwimmer	0.80	0.00	0.20
	sailorPunchNun	0.80	0.00	0.20
	witchPunchBoxer	0.76	0.00	0.24
Shoot		**0.92**	**0.006**	**0.08**
	boxerShootDoctor	1.00	0.00	0.00
	clownShootTeacher	1.00	0.00	0.00
	cookShootBodyguard	1.00	0.00	0.00
	cookShootClown	1.00	0.00	0.00
	cookShootTeacher	1.00	0.00	0.00
	doctorShootBoxer	1.00	0.00	0.00
	knightShootPirate	1.00	0.00	0.00
	knightShootSailor	1.00	0.00	0.00
	sailorShootNativeAmerican	1.00	0.00	0.00
	sailorShootPoliceman	1.00	0.00	0.00

Verb	Movie clip	Active	Passive	Other
	sailorShootTeacher	1.00	0.00	0.00
	waitressShootPirate	1.00	0.00	0.00
	nativeAmericanShootCook	0.95	0.05	0.00
	nunShootBodyguard	0.94	0.06	0.00
	bodyguardShootCook	0.95	0.00	0.05
	cowboyShootKnight	0.95	0.00	0.05
	doctorShootCook	0.95	0.00	0.05
	policemanShootSwimmer	0.95	0.00	0.05
	swimmerShootClown	0.95	0.00	0.05
	waitressShootDancer	0.95	0.00	0.05
	bodyguardShootKnight	0.90	0.05	0.05
	knightShootCowboy	0.94	0.00	0.06
	swimmerShootSailor	0.94	0.00	0.06
	boxerShootNativeAmerican	0.90	0.00	0.10
	clownShootSwimmer	0.90	0.00	0.10
	clownShootWitch	0.90	0.00	0.10
	dancerShootClown	0.90	0.00	0.10
	doctorShootNativeAmerican	0.90	0.00	0.10
	knightShootPoliceman	0.90	0.00	0.10
	pirateShootWaitress	0.90	0.00	0.10
	policemanShootKnight	0.90	0.00	0.10
	sailorShootWaitress	0.90	0.00	0.10
	teacherShootClown	0.90	0.00	0.10
	teacherShootDancer	0.90	0.00	0.10
	teacherShootWaitress	0.90	0.00	0.10
	waitressShootCook	0.90	0.00	0.10
	waitressShootPoliceman	0.90	0.00	0.10
	waitressShootSailor	0.90	0.00	0.10
	boxerShootNun	0.85	0.05	0.10
	sailorShootNun	0.89	0.00	0.11
	dancerShootNun	0.86	0.00	0.14
	pirateShootDancer	0.86	0.00	0.14
	nunShootCook	0.81	0.05	0.14
	clownShootDancer	0.85	0.00	0.15
	policemanShootSailor	0.85	0.00	0.15
	policemanShootWaitress	0.85	0.00	0.15
	swimmerShootCook	0.85	0.00	0.15
	swimmerShootPoliceman	0.85	0.00	0.15
	sailorShootClown	0.80	0.05	0.15
	nativeAmericanShootDoctor	0.81	0.00	0.19
	swimmerShootTeacher	0.81	0.00	0.19

Verb	Movie clip	Active	Passive	Other
Tickle		**0.90**	**0.01**	**0.08**
	clownTickleCook	1.00	0.00	0.00
	cowboyTicklePoliceman	1.00	0.00	0.00
	doctorTickleMonk	1.00	0.00	0.00
	nunTickleClown	1.00	0.00	0.00
	sailorTickleNun	1.00	0.00	0.00
	swimmerTicklePoliceman	1.00	0.00	0.00
	waitressTickleWitch	1.00	0.00	0.00
	bodyguardTickleTeacher	0.95	0.05	0.00
	clownTickleKnight	0.95	0.00	0.05
	clownTickleNun	0.95	0.00	0.05
	monkTicklePoliceman	0.95	0.00	0.05
	nunTickleDoctor	0.95	0.00	0.05
	nunTickleMonk	0.95	0.00	0.05
	pirateTickleNun	0.95	0.00	0.05
	witchTickleNativeAmerican	0.95	0.00	0.05
	witchTickleSwimmer	0.95	0.00	0.05
	bodyguardTickleNativeAmerican	0.90	0.05	0.05
	monkTickleNun	0.94	0.00	0.06
	boxerTickleWitch	0.90	0.00	0.10
	cookTickleClown	0.90	0.00	0.10
	dancerTickleNativeAmerican	0.90	0.00	0.10
	nativeAmericanTickleBoxer	0.90	0.00	0.10
	monkTickleTeacher	0.90	0.00	0.10
	pirateTicklePoliceman	0.90	0.00	0.10
	sailorTickleBodyguard	0.90	0.00	0.10
	waitressTicklePoliceman	0.90	0.00	0.10
	witchTickleCowboy	0.90	0.00	0.10
	teacherTickleBodyguard	0.86	0.05	0.10
	bodyguardTickleSailor	0.85	0.05	0.10
	cookTickleWaitress	0.85	0.05	0.10
	policemanTickleSwimmer	0.85	0.05	0.10
	monkTickleSwimmer	0.81	0.10	0.10
	clownTicklePirate	0.88	0.00	0.13
	monkTickleDoctor	0.86	0.00	0.14
	pirateTickleClown	0.81	0.05	0.14
	policemanTickleWaitress	0.76	0.10	0.14
	boxerTickleNativeAmerican	0.85	0.00	0.15
	nativeAmericanTickleDancer	0.85	0.00	0.15
	pirateTickleKnight	0.85	0.00	0.15
	sailorTickleCowboy	0.80	0.00	0.20
	swimmerTickleWitch	0.80	0.00	0.20

Verb	Movie clip	Active	Passive	Other
	cowboyTickleSailor	0.75	0.05	0.20

C) Ditransitive

Verb	Movie clip	PO	DO	Other
Deliver		**0.83**	**0.03**	**0.14**
	doctorDeliverDancerCup	0.94	0.06	0.00
	nunDeliverPirateHat	0.94	0.06	0.00
	boxerDeliverTeacherBook	0.95	0.00	0.05
	clownDeliverMonkHat	0.95	0.00	0.05
	monkDeliverKnightHat	0.95	0.00	0.05
	pirateDeliverSwimmerBall	0.95	0.00	0.05
	teacherDeliverBoxerBook	0.90	0.05	0.05
	policemanDeliverMonkBall	0.85	0.10	0.05
	cowboyDeliverNunCup	0.90	0.00	0.10
	dancerDeliverKnightHat	0.90	0.00	0.10
	monkDeliverPirateBall	0.90	0.00	0.10
	policemanDeliverSailorCup	0.90	0.00	0.10
	policemanDeliverWaitressHat	0.90	0.00	0.10
	waitressDeliverPolicemanHat	0.90	0.00	0.10
	bodyguardDeliverWaitressBook	0.85	0.05	0.10
	cowboyDeliverSailorHat	0.85	0.05	0.10
	teacherDeliverDancerBook	0.80	0.10	0.10
	swimmerDeliverDancerCup	0.86	0.00	0.14
	nunDeliverCowboyCup	0.85	0.00	0.15
	swimmerDeliverWaitressHat	0.85	0.00	0.15
	sailorDeliverPolicemanCup	0.80	0.05	0.15
	cookDeliverPolicemanBall	0.76	0.05	0.19
	sailorDeliverBoxerBall	0.76	0.05	0.19
	pirateDeliverMonkBall	0.71	0.10	0.19
	sailorDeliverMonkBall	0.71	0.10	0.19
	knightDeliverNativeAmericanBook	0.80	0.00	0.20
	monkDeliverWitchCup	0.80	0.00	0.20
	boxerDeliverSailorBall	0.75	0.05	0.20
	dancerDeliverSailorBall	0.75	0.05	0.20
	pirateDeliverNunBall	0.75	0.05	0.20
	waitressDeliverCowboyBall	0.75	0.05	0.20
	monkDeliverPolicemanBall	0.71	0.05	0.24
	waitressDeliverCowboyHat	0.71	0.05	0.24
	waitressDeliverBodyguardBook	0.75	0.00	0.25
	dancerDeliverSailorBook	0.70	0.00	0.30
	dancerDeliverSwimmerCup	0.65	0.05	0.30

Verb	Movie clip	PO	DO	Other
Give		**0.57**	**0.36**	**0.06**
	monkGiveClownBall	0.70	0.30	0.00
	monkGiveNunBall	0.60	0.40	0.00
	monkGiveWaitressHat	0.65	0.35	0.00
	nunGiveClownBall	0.65	0.35	0.00
	nunGiveKnightHat	0.76	0.24	0.00
	pirateGiveNunBall	0.81	0.19	0.00
	policemanGiveCowboyBall	0.67	0.33	0.00
	policemanGiveWitchBall	0.81	0.19	0.00
	witchGiveMonkBall	0.63	0.38	0.00
	sailorGiveSwimmerCup	0.55	0.40	0.05
	clownGiveNunBall	0.50	0.45	0.05
	cowboyGiveWitchBook	0.50	0.45	0.05
	nunGiveCowboyHat	0.50	0.45	0.05
	waitressGiveSwimmerHat	0.50	0.45	0.05
	swimmerGiveWaitressHat	0.45	0.50	0.05
	monkGiveSailorHat	0.43	0.52	0.05
	swimmerGiveWitchBall	0.24	0.71	0.05
	cowboyGivePirateHat	0.60	0.35	0.05
	nunGiveBoxerHat	0.62	0.33	0.05
	nunGiveMonkBall	0.62	0.33	0.05
	nunGivePirateBall	0.60	0.35	0.05
	waitressGiveDoctorBall	0.65	0.30	0.05
	witchGiveCowboyBook	0.65	0.30	0.05
	witchGivePolicemanBall	0.76	0.19	0.05
	clownGiveCookBall	0.55	0.35	0.10
	sailorGiveBoxerBall	0.55	0.35	0.10
	bodyguardGiveMonkBall	0.50	0.40	0.10
	waitressGiveMonkHat	0.40	0.50	0.10
	boxerGiveKnightHat	0.38	0.52	0.10
	clownGiveCowboyCup	0.38	0.52	0.10
	clownGiveSwimmerCup	0.60	0.30	0.10
	pirateGiveBodyguardBall	0.65	0.25	0.10
	policemanGiveSwimmerHat	0.76	0.14	0.10
	sailorGivePirateHat	0.76	0.14	0.10
	pirateGiveSailorHat	0.47	0.42	0.11
	nativeAmericanGiveKnightHat	0.45	0.40	0.15
	clownGiveMonkBall	0.50	0.30	0.20
	monkGiveBodyguardBall	0.40	0.40	0.20
Sell		**0.69**	**0.17**	**0.14**
	swimmerSellWaitressBall	0.85	0.15	0.00
	clownSellSailorHat	0.81	0.19	0.00

Verb	Movie clip	PO	DO	Other
	cookSellWaitressHat	0.81	0.19	0.00
	dancerSellMonkHat	0.80	0.20	0.00
	pirateSellCookBall	0.75	0.25	0.00
	clownSellKnightCup	0.95	0.00	0.05
	sailorSellKnightHat	0.90	0.05	0.05
	bodyguardSellNunHat	0.86	0.10	0.05
	knightSellPirateBall	0.81	0.14	0.05
	sailorSellSwimmerHat	0.80	0.15	0.05
	swimmerSellCookBall	0.75	0.20	0.05
	pirateSellWaitressBall	0.86	0.05	0.10
	waitressSellClownBall	0.85	0.05	0.10
	bodyguardSellDoctorBook	0.80	0.10	0.10
	policemanSellPirateBall	0.76	0.14	0.10
	clownSellNativeAmericanCup	0.70	0.20	0.10
	cookSellPirateBall	0.70	0.20	0.10
	dancerSellPirateHat	0.70	0.20	0.10
	pirateSellDancerHat	0.70	0.20	0.10
	policemanSellBoxerBook	0.70	0.20	0.10
	sailorSellCookHat	0.70	0.20	0.10
	pirateSellTeacherBook	0.67	0.24	0.10
	boxerSellTeacherCup	0.65	0.25	0.10
	clownSellCookBall	0.65	0.25	0.10
	doctorSellCookCup	0.63	0.25	0.13
	teacherSellDancerBook	0.86	0.00	0.14
	policemanSellTeacherBall	0.76	0.10	0.14
	cookSellClownBall	0.71	0.14	0.14
	swimmerSellBodyguardBall	0.52	0.33	0.14
	nativeAmericanSellMonkHat	0.48	0.38	0.14
	swimmerSellKnightHat	0.38	0.48	0.14
	doctorSellBodyguardBook	0.80	0.05	0.15
	dancerSellDoctorBook	0.75	0.10	0.15
	nunSellBodyguardBook	0.75	0.10	0.15
	witchSellClownCup	0.75	0.10	0.15
	teacherSellBoxerCup	0.70	0.15	0.15
	knightSellBoxerCup	0.65	0.20	0.15
	knightSellNunCup	0.65	0.20	0.15
	policemanSellWaitressHat	0.65	0.20	0.15
	knightSellSailorHat	0.71	0.10	0.19
	monkSellTeacherHat	0.71	0.10	0.19
	sailorSellCookBall	0.57	0.24	0.19
	clownSellTeacherBall	0.75	0.05	0.20
	boxerSellPirateCup	0.65	0.15	0.20

Verb	Movie clip	PO	DO	Other
	clownSellKnightBook	0.65	0.15	0.20
	nativeAmericanSellClownCup	0.60	0.20	0.20
	teacherSellDancerCup	0.63	0.16	0.21
	monkSellNativeAmericanHat	0.48	0.29	0.24
	boxerSellKnightCup	0.70	0.05	0.25
	knightSellClownCup	0.60	0.15	0.25
	teacherSellPolicemanHat	0.55	0.20	0.25
	knightSellSailorBall	0.50	0.25	0.25
	pirateSellClownBall	0.43	0.29	0.29
	cookSellDoctorCup	0.60	0.10	0.30
	swimmerSellTeacherBall	0.50	0.15	0.35
Show		**0.52**	**0.39**	**0.10**
	swimmerShowCookBook	0.50	0.50	0.00
	waitressShowSailorBall	0.50	0.50	0.00
	nativeAmericanShowKnightBook	0.40	0.60	0.00
	teacherShowCookHat	0.40	0.60	0.00
	cookShowTeacherHat	0.63	0.38	0.00
	knightShowClownBall	0.75	0.25	0.00
	teacherShowSailorHat	0.60	0.40	0.00
	sailorShowClownBall	0.55	0.40	0.05
	waitressShowClownHat	0.50	0.45	0.05
	pirateShowBoxerHat	0.48	0.48	0.05
	teacherShowBoxerBook	0.45	0.50	0.05
	doctorShowKnightBook	0.40	0.55	0.05
	knightShowNativeAmericanBook	0.60	0.35	0.05
	knightShowSailorBall	0.62	0.33	0.05
	swimmerShowPirateBall	0.60	0.35	0.05
	swimmerShowTeacherBall	0.70	0.25	0.05
	cookShowNativeAmericanCup	0.50	0.44	0.06
	clownShowSailorHat	0.55	0.35	0.10
	cowboyShowDancerBook	0.55	0.35	0.10
	knightShowDoctorBook	0.55	0.35	0.10
	sailorShowClownHat	0.55	0.35	0.10
	waitressShowKnightBall	0.55	0.35	0.10
	sailorShowKnightBall	0.50	0.40	0.10
	waitressShowSwimmerBook	0.50	0.40	0.10
	bodyguardShowCookBook	0.48	0.43	0.10
	clownShowBoxerCup	0.45	0.45	0.10
	cookShowClownCup	0.43	0.48	0.10
	boxerShowCookCup	0.40	0.50	0.10
	clownShowMonkHat	0.40	0.50	0.10
	monkShowClownBook	0.40	0.50	0.10

Verb	Movie clip	PO	DO	Other
	teacherShowPirateBall	0.40	0.50	0.10
	waitressShowTeacherBall	0.40	0.50	0.10
	policemanShowClownBall	0.35	0.55	0.10
	teacherShowCookCup	0.29	0.62	0.10
	nunShowTeacherHat	0.60	0.30	0.10
	policemanShowPirateBall	0.60	0.30	0.10
	sailorShowPirateBall	0.76	0.14	0.10
	teacherShowNunHat	0.76	0.14	0.10
	teacherShowPolicemanBall	0.57	0.29	0.14
	sailorShowWaitressBall	0.52	0.33	0.14
	swimmerShowTeacherHat	0.52	0.33	0.14
	cookShowBodyguardBook	0.48	0.38	0.14
	nativeAmericanShowCookCup	0.62	0.24	0.14
	policemanShowTeacherHat	0.67	0.19	0.14
	sailorShowTeacherHat	0.67	0.19	0.14
	swimmerShowBodyguardHat	0.71	0.14	0.14
	policemanShowPirateHat	0.55	0.30	0.15
	boxerShowTeacherBook	0.50	0.35	0.15
	dancerShowTeacherCup	0.50	0.35	0.15
	knightShowWaitressBall	0.50	0.35	0.15
	policemanShowClownHat	0.50	0.35	0.15
	swimmerShowPirateHat	0.45	0.40	0.15
	teacherShowPolicemanHat	0.45	0.40	0.15
	sailorShowWaitressCup	0.40	0.45	0.15
	teacherShowDancerCup	0.60	0.25	0.15
	doctorShowBodyguardBook	0.52	0.29	0.19
	pirateShowWitchCup	0.24	0.57	0.19
	knightShowPirateHat	0.40	0.40	0.20