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L1 Acquisition of Classifiers & Count-Mass Distinction (Mandarin)

In numerical classifier languages, such as Mandarin, classifiers are morphemes that occur next to numerals and “classify” nouns on some semantic basis (see entry on *Classifiers*). For example, ‘three cats’ in Mandarin requires the classifier 隻 *zhī*, which is typically used with nouns for animals (*sān zhī māo* 三隻貓 ‘three CLASSIFIER cat’). Thus, nominal syntax differs between classifier languages and “count-mass” languages such as English. In this review, we first focus on how children learning classifier languages inform us about the development of the count-mass distinction. We then turn towards research on classifier acquisition as a window into understanding object classification and quantification.

1. Classifier languages vs. count-mass languages

In count-mass languages such as English, nouns for object kinds such as ‘table’ are often count nouns, whereas substance kinds such as ‘wood’ are mass nouns. Count nouns occur in singular and plural forms (e.g., a *table* vs. some *tables*), and can directly co-occur with numerals (*three tables*) and quasi-cardinal quantifiers and determiners (*many/these tables*). Mass nouns cannot directly occur with numerals or plural morphology (**three sands*) or with quasi-cardinal quantifiers (e.g., **many sand*). In contrast, nouns in classifier languages such as Mandarin lack obligatory singular-plural morphology; they cannot co-occur directly with numerals, and instead require a classifier (e.g., *sān zhī māo*). Thus, some have suggested that all nouns are mass in classifier languages (Allan 1980, Chierchia 1998). Despite the lack of count-mass distinction at the level of the noun in classifier languages, linguists such as Cheng and Sybesma (1998, 1999) have argued that the count-mass distinction is reflected at the level of the classifier. According to their proposal, classifiers in Chinese can be separated into count and mass classifiers through syntactic distribution. Count classifiers, often called sortal classifiers, indicate counting units for sortal nouns (i.e., nouns that name things with principled counting units, such as ‘tables’) and are related to these nouns by rote memorization. In contrast, mass classifiers, often called mensural classifiers or measure words, are often productive and form a temporary relationship with nouns (Tai 1994). On this view, sortal classifiers classify nouns that are semantically like English count nouns, while mensural classifiers are like English measure words (e.g., pieces, slices).

Testing Mandarin-speaking four- and six-year-olds, Li *et al.* (2008) found that although children are sensitive to how sortal classifiers pick out individuals and how mensural classifiers select

over portions of substances or objects, the acquisition of the count-mass distinction is protracted relative to English-speaking children (see also Chien *et al.* 2003). Not until six years old do Mandarin-speaking children truly understand that sortal classifiers serve as cues to individuation. For example, young children, unlike adults, accept sortal classifiers for enumerating substances such as puddles of water (Huang and Lee 2009). They are also less likely than adults to think that a novel noun introduced with a sortal classifier denotes an object-kind rather than substance-kind (Cheung *et al.* 2010). Thus, although the count-mass distinction may be made at the level of the classifier as suggested by Cheng and Sybesma, its acquisition follows a different trajectory than that of English-speaking children.

1.1 Acquisition of the mass-count distinction and object-substance construals

The count-mass distinction is a grammatical distinction that roughly corresponds to a conceptual distinction between objects and substances, or, more broadly, between individuated and non-individuated entities. Some researchers have suggested that mastering the count-mass distinction is instrumental to the development of concepts like “object,” “substance,” or “individual” (e.g., Quine 1960). Others have suggested that the grammatical distinction is simply a reflection of an important conceptual distinction that is part of our natural endowment (e.g., Macnamara 1982, Soja *et al.* 1991).

By two years old, even before they can reliably produce count-mass syntax, English learners use noun syntax in comprehension to determine whether a novel word refers to an object-kind or a substance-kind (e.g., “Find a/some blicket.”; Brown 1973, Soja 1992). This may be evidence that the object-substance ontology is in place prior to acquiring count-mass syntax. However, it is possible that early exposure to the English language is sufficient to allow children to construct the conceptual distinction. Thus, a stronger test would be to test children who have not yet acquired the count-mass syntax.

Studies with prelinguistic infants have shown that by five months old, infants expect solids and liquids to behave differently. For example, they expect straws to penetrate liquids but not solids (see Hespos and van Marle 2012 for a review). They also quantify by number for solids but not for non-solids, responding to a change in number for sand-pile-looking objects, but not for sand piles (Huntley-Fenner *et al.* 2002, Rosenberg and Carey 2009). These studies provide evidence that the object-substance ontology is likely present prior to learning the count-mass distinction. However, the object-substance ontology goes beyond treating solids differently than non-solids, since entities (e.g., wooden tables) can often be construed either as a kind of object (tables) or substance (wood).

Studies with classifier language learners can shed light on the effects of language on object-substance construals (e.g., Imai and Gentner 1997, Li *et al.* 2009). These studies showed that when two-year-old Mandarin and Japanese learners are asked to extend a novel noun naming a novel

object (e.g., a wooden reamer) either to an object-kind (a plastic reamer) or a substance-kind (wood), they tend to choose the object-kind for complex-shaped solids and the substance-kind for non-solids, just like their English-speaking counterparts. For simple-shaped solids (e.g., a chunk of cork), they randomly choose between the object-kind (a chunk of clay) and the substance-kind (cork). By three years old, however, English learners begin to prefer object-kind extensions more often than classifier language learners. While this may suggest that English speakers perceive objects differently because of their language, an alternative account – the lexical statistics hypothesis – argues that the cross-linguistic differences can be explained by the fact that English requires its speakers to assign mass or count syntax to nouns. Since the frequency of count nouns is higher than that of mass nouns, when English speakers encounter a new word, they are more likely to assume that it is a count noun (see Barner *et al.* 2010 for a review).

2. Sortal classifiers and classification

Research on children’s acquisition of classifiers has been conducted in numerous languages, including Chinese (e.g., Mandarin, Cantonese, and Taiwanese), Japanese, Thai, and Vietnamese (for summaries, see Matsumoto 1987, Tran 2011). To learn sortal classifiers, children first rote-memorize noun-classifier pairings, and then generalize the pairings to new nouns (Erbaugh 1986). By age three, children often correctly select unfamiliar referents on the basis of classifiers in comprehension studies, suggesting that they have made appropriate generalizations regarding the semantics of many classifiers (Sumiya and Colunga 2006, Huang and Chen 2009, Li *et al.* 2010). In production, children are often more conservative, using a “default” or “general” classifier instead of the correct, specific classifier (Erbaugh 1986, Myers and Tsay 2000; but see Clark 1976 for over-extensions). Although children’s classifier selection in production may not always be appropriate, they rarely omit a classifier when syntactically required, indicating that classifier syntax is mastered earlier than classifier semantics (Erbaugh 1986, Wong 1998, Hu 1993).

Given that sortal classifiers classify nouns according to intrinsic properties of the referents along dimensions such as animacy, shape, and function, researchers hope that uncovering the order in which classifiers are learned will reveal the saliency of conceptual categories in the minds of learners, with the assumption that more salient categories would be acquired earlier (e.g., Sanches 1977, Yamamoto and Keil 2000, Uchida and Imai 1999). Some studies have shown that classifiers for animate categories are easier to learn than those for functionality or for shape (Loke 1991), but no consensus is reached in the literature (e.g., Loke and Harrison 1986, Erbaugh 1986, Tse *et al.* 2007). The reason may have to do with the fact that animacy, shape, and function are all salient concepts that children possess prior to figuring out how classifiers categorize nouns. For example, Hu (1993) found that children could select items on the basis of animacy, function, and shape (e.g., “Show me things that move by themselves” or “Give me things that are flat and thin”) even before

they grasp the meanings of the classifiers. Her results thus suggest that factors other than children's developing cognitive ability (e.g., frequency of classifiers in the input) may influence the order of classifier acquisition.

3. Mensural classifiers and quantification

More recently, researchers have begun investigating the acquisition of mensural classifiers or measure words. Mensural classifiers package entities (e.g., two *boxes* of forks; two *mounds* of cream) or partition them to form 'individuals' (e.g., two *pieces* of (the) pizza, two *drops* of the medicine; see also entry on *Classifiers*). In comprehension studies, children typically perform better for sortal than mensural classifiers (Yīng 应 *et al.* 1983, Huang and Chen 2009, Li *et al.* 2010). For example, when asked for one pile (*yī duī* 一堆) of strawberries and shown one individual strawberry, one pile of strawberries, or one boxful of strawberries, many two- and three-year-olds incorrectly choose one strawberry (Li *et al.* 2010). Similar findings have been observed with the acquisition of collective nouns (e.g., family, team) in English. When asked "how many *teams* (of tennis players)?" English-speaking children often count individuals rather than the group (Shipley and Shepperson, 1990). This behavior is not restricted to counting. When asked to choose which picture matches words such as 'army', English-speaking children choose the picture of a single soldier over that of a group of soldiers (Huntley-Fenner 1995, Bloom and Keleman 1995). Children's difficulty in learning mensural classifiers or collective nouns may be due to a conceptual predisposition to treat spatio-temporally discrete entities as individuals for quantification (Shipley and Shepperson 1990, Wagner and Carey 2003).

In addition, preschool-age children have difficulty grasping how numerals, measure words, and nouns are combined to denote quantities. Studies with English- and Mandarin-speaking children have found that some three- and four-year-old children incorrectly accept "three cups of sand" for situations when there are three cups, but not all of which contain sand (Wang *et al.* 2013). Moreover, whereas adults typically only accept three (more-or-less equally) full cups of sand poured into a single pile as "three cups of sand," four- and five-year-old children are indiscriminate about the amount of sand in each cup (Li *et al.* 2011). This suggests that children may not fully understand specifically how 'cup' acts as a unit, and more generally, how measure expressions reference measured amounts but not simply individuals (e.g., "three cupfuls of wine in the pot" is about three measured-out cups rather than three physical cups of wine).

Languages have means to distinguish measure readings from individual readings (e.g., Cheng and Sybesma 1998, Rothstein 2010, Zhang 2011). For example, the presence of *de* 的 in *sān bēi de jiǔ* 三杯的酒 in Mandarin is taken to mean "three cupfuls of wine" and does not necessarily require there to be three physical cups (Li *et al.* 2008, Exp. 3). Future studies can explore children's acquisition of these measure expressions, how the acquisition of measure expressions influences

their developing notions of measurement and standard measures (e.g., “ounces”, “centimeters”) and links to notions of conservation. This area of classifier acquisition is a fruitful domain for further research on the relation between language development and conceptual development.

Summary: This article provides a survey of what is known about the acquisition of classifiers and count-mass syntax to-date, drawing upon studies not only of children learning Mandarin Chinese, but also of children learning typologically different languages like English.

Key words: classifiers, count-mass syntax, count classifiers, measure words, quantification, language acquisition, object-substance distinction, Mandarin

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