

CHAPTER ONE

NAMING ARTIFACTS: PATTERNS AND PROCESSES

Barbara C. Malt

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Abstract

Nouns such as *knife*, *fork*, *box*, and *bench* that name artifacts (human-made objects) are applied to diverse sets of objects that cannot be fully predicted by any single type of dimension. Explaining the complexity of artifact naming

1 patterns requires considering both how name extensions evolve over time and 1
2 how the goal-driven nature of communication contributes to labeling choices by 2
3 speakers. Because of these influences, an account of artifact naming will differ 3
4 from an account of how people conceptualize the objects nonlinguistically. The 4
5 complexity of naming patterns is not readily explained away by trying to limit 5
6 the range of exemplars that should count in the analysis of a given name, 6
7 because principled bases for limitations are lacking. The social nature of 7
8 communication mitigates this complexity in language use: Interactions between 8
9 speakers and addressees help ensure that artifact nouns in discourse are 9
10 interpreted as intended despite the wide range of objects each can encompass. 10
11 However, the complexity is further manifested in substantial variability in 11
12 naming patterns for the same sets of objects across different languages. This 12
13 cross-linguistic variability poses special challenges for the child language 13
14 learner, learners of multiple languages, and researchers interested in under- 14
15 standing how language may influence thought. 15
16

17 **1. INTRODUCTION** 17

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19
20 “Smart” phones today not only allow voice communication but take 20
21 photos and video, play music, browse the web, send and receive e-mail, edit 21
22 text, assist in way-finding, and launch a wide variety of other applications. 22
23 A recent television ad for one such phone features the company CEO 23
24 commenting, “It’s amazing we still call it a phone.” Amazing indeed, 24
25 when we consider how different these phones are in their functional 25
26 capabilities, appearance, and mode of transmission from the phones that 26
27 have come and gone over the last 150 years, and even from those still 27
28 attached by a cord to a phone jack in many households today. But it is not 28
29 amazing at all in the context of a broader consideration of how names for 29
30 artifacts (human-made objects) are used. In this chapter, I will illustrate the 30
31 diversity of objects to which ordinary artifact nouns are extended. I will 31
32 then present an account of how they come to be used in these ways. Next, I 32
33 will discuss issues that arise in interpreting the examples, including whether 33
34 alternative accounts are possible. I will also consider the implications of this 34
35 diversity and how it arises for related areas of inquiry in cognitive psychol- 35
36 ogy. By its focus on artifact naming, this chapter is most directly about 36
37 *language use* and not about *concepts*. Although how people talk about artifacts 37
38 is no doubt closely linked in some respects to how they think about them, 38
39 each needs to be understood on their own terms, as I will argue. Implica- 39
40 tions from this discussion of language use for the psychology of concepts 40
41 will be considered at several points. 41

42 Many words have multiple meanings that are quite distinct from one 42
43 another. A classic example is the case of *bank*, which can mean both 43
44 a financial institution and the ground sloping down to a creek or river. 44

1 Other sorts of examples include *newspaper*, which can refer to both a 1
2 physical object that is read in the morning and the company that produces 2
3 it (as in “The newspaper won’t allow the staff to join the union”), and 3
4 *running*, which can refer to human locomotion, water coming out of a tap, 4
5 and a movie that is in progress, along with many other types of actions. *Bank* 5
6 is considered a case of homonymy, in which the two meanings have no 6
7 apparent relation to one another (and may even have come about independ- 7
8 ent of one another; see, e.g., etymology in Oxford English Dictionary 8
9 on-line <http://dictionary.oed.com/entrance.dtl>). The second case (*newspa-* 9
10 *per*) involves metonymy, in which one entity is used to stand for another 10
11 (e.g., Lakoff, 1987; Nunberg, 1979), and the third (*running*) may involve 11
12 metaphorical extensions of a word from a concrete meaning to more 12
13 abstract ones. All of these cases demonstrate the great flexibility that words 13
14 have to take on a wide range of meanings, and the corresponding flexibility 14
15 that language users must have to use and interpret words appropriately 15
16 despite the variations in what they are intended to convey on different 16
17 occasions of use. Yet none of these examples quite captures the case of the 17
18 modern phone. It does not seem to be homonymy, metonymy, or meta- 18
19 phor when you call an object small enough to close your fist around, with all 19
20 its “smart” capabilities, by the name *phone*, and at the same time use that 20
21 name for the clunky thing attached to your phone jack at home, and for 21
22 Alexander Graham Bell’s 1876 brass cylinder with a flexible tube that 22
23 transmitted a voice to the next room through a liquid medium (see [http://](http://en.wikipedia.org/wiki/History_of_the_telephone) 23
24 en.wikipedia.org/wiki/History_of_the_telephone). These uses of the name 24
25 are clearly related, and they all seem to name a concrete object, and the 25
26 whole of the object, in a literal way. Likewise, it is neither homonymy, 26
27 metonymy, nor metaphor allows you to use *box* for a small plastic container 27
28 holding 100 thumbtacks that snaps shut as well as a large cardboard 28
29 container with flaps that holds a computer, or that lets you use *brush* for both a 29
30 long, thin thing with fine, soft hairs that applies watercolors and a rectan- 30
31 gular thing with stiff wire bristles that scrapes off rust. It is these more 31
32 ordinary uses of names that I will discuss. At first glance they may seem more 32
33 mundane, but the naming patterns they reveal are complex and by no means 33
34 trivial to explain. 34
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2. HOW ARE ARTIFACT NOUNS EXTENDED?

38 I take as a starting assumption that names for artifacts generally have 38
39 associated with them some elements of meaning that reflect typical, familiar, 39
40 common uses. For instance, the meaning most closely associated with *box* 40
41 might be that it is a squarish cardboard container with flaps meant for 41
42 holding one or a few solid objects. These elements of meaning do not, by 42
43 43
44 44

1 themselves, account for many uses of artifact names, such as when *box* is 1
2 applied to the plastic container with a snap lid for tacks (much less a child's 2
3 juice box holding liquid and accessed only through a straw). So the question 3
4 is how the noun is extended to other sorts of objects. This question of 4
5 "how," itself, actually has two interpretations. The first is as a descriptive 5
6 question: What are the observed instances and patterns of use of artifact 6
7 names? The second is as a theoretical question: How can these observations 7
8 be accounted for? I will address both parts of the "how" question. 8
9

10 2.1. What Are the Observed Instances and Patterns of 10 11 Use of Artifact Names? 11 12

13 In this section, I will consider how the most obvious, observable properties 13
14 of artifacts—their functions and their physical features—are related to the 14
15 name they receive. These are the sorts of features that people generally 15
16 produce when asked to describe an artifact or to list features associated with 16
17 artifact names (e.g., Malt & Smith, 1984; Rosch & Mervis, 1975). Less 17
18 observable factors may also contribute to naming patterns, and this possibil- 18
19 ity will be addressed in considering theoretical accounts for the patterns. 19
20 I will draw on English noun uses only, although the naming patterns of 20
21 English do not necessarily match the naming patterns of other languages. 21
22 I will take up this cross-linguistic variation later. 22
23

24 2.1.1. Function-Based Extension 24

25 Many people have the intuition that artifact names must be extended based 25
26 on function. Artifacts generally exist for some specific purpose (even if only 26
27 decorative, but usually for more active use), and so it is not surprising that 27
28 their function is central to how people think about them. As Kelemen 28
29 (1999), Kemler Nelson and colleagues (e.g., Greif, Kemler Nelson, Keil, & 29
30 Gutierrez, 2006), and others have pointed out, when encountering a new 30
31 artifact, "What's it for?" is likely to be one of the first and most compelling 31
32 questions asked about it. Miller and Johnson-Laird (1976) took it as a given 32
33 that function is more basic than form in determining artifact categories, and 33
34 this sentiment is frequently echoed by others (e.g., Medin & Ortony, 1989; 34
35 Rips, 1989). 35

36 Consistent with these intuitions, it is easy to provide examples of artifact 36
37 nouns that are applied to objects differing substantially in form but sharing a 37
38 function. *Chair*, for instance, is used to label objects for seating one person, 38
39 whether they are large and stuffed, small and wooden, plastic and woven, or 39
40 like a giant beanbag. *Key* is used for objects that open locks on doors, 40
41 whether made of metal and inserted to physically turn a deadbolt, or 41
42 resembling a credit card with a magnetic stripe that is swiped, or operating 42
43 a car door from a remote location by the push of a button. *Fan* is used for 43
44 devices to move air for cooling people, including electric box fans with 44

1 blades and Japanese paper fans. *Razor* is used for objects that shave hair off a 1
2 person, including devices having a straight blade and operated manually, 2
3 and objects having several whirling circular cutting mechanisms powered by 3
4 electricity. *Camera* is used for boxy objects that record images on film and 4
5 need to be grasped with two hands as well as for tiny things embedded in 5
6 cell phones that yield digital records of a scene. 6

7 Such examples confirm that function is an important dimension along 7
8 which artifact names can be extended. Yet a closer look reveals that function 8
9 does not constrain the name an artifact receives in the sense of providing 9
10 boundary conditions for use of a name. Artifacts with different functions 10
11 sometimes are labeled by the same name, and artifacts with the same function 11
12 sometimes are labeled by different names. To illustrate these two facts, I now 12
13 turn to cases where form is integral to the use of an artifact name. 13

14 2.1.2. Form-Based Extension 14

15 The form of an artifact (by which I mean its shape, material, and other 15
16 aspects of its physical make-up) has sometimes been characterized as a 16
17 “superficial” aspect of the artifact that is secondary in importance to a 17
18 “deeper” aspect, its function (e.g., Medin & Ortony, 1989; Miller & 18
19 Johnson-Laird, 1976; Rips, 1989; Xu & Rhemtulla, 2005). Some research- 19
20 ers have argued that although early naming of artifacts may be based on 20
21 form, children progress to a more mature focus on function by about age 21
22 4 or 5 (e.g., Diesendruck, Hammer, & Catz, 2003), and others have even 22
23 argued that children use function from as early as age 2 (e.g., Kemler 23
24 Nelson, Russell, Duke, & Jones, 2000). Nevertheless, it seems quite com- 24
25 mon for artifact names to be extended based heavily on form rather than 25
26 function. *Brush* is used for objects with handles and bristles or hairs including 26
27 variations made to smooth and untangle hair, apply paint to a surface, push 27
28 snow off a windshield, scrub dirt or rust off a surface, and produce soft 28
29 sounds on a drum by being drawn across the surface. *Bowl* is used for deep, 29
30 rounded dishes made for eating liquids such as soups and also for storing 30
31 solids such as fruit and serving granules such as sugar. *Rake* is used for objects 31
32 with long handles and tines including variations made to gather up leaves, 32
33 break apart thatch, dig stones from within soil, level and create patterns in 33
34 soil or sand, and pull snow off a roof. *Knife* is used for objects with handles 34
35 and blades that are sharp for cutting or dull and flexible for applying frosting 35
36 to a cake, putty to a window, and spackle to a wall. *Sponge* is used for objects 36
37 with natural or artificial sponge material that wipe dirt off surfaces (cleaning 37
38 sponges), sand old coverings off (sanding sponges with an abrasive coating) 38
39 or apply paint to surfaces (painting sponges). *Fork* is used for objects that 39
40 bring food to the mouth, hold food in place (carving fork), serve from a 40
41 platter by supporting on the surface of the tines (fish-serving fork), take the 41
42 temperature of grilled food (thermometer fork; see <http://www.williams-sonoma.com/products/7839004/index.cfm>), scoop and move manure 42
43 43
44 44

1 (manure fork; see [http://www.thefind.com/garden/info-5-tine-manure-](http://www.thefind.com/garden/info-5-tine-manure-fork) 1
2 fork) and make a musical note (tuning fork). In all these cases, the functions 2
3 of the objects sharing a name are less similar than their forms are. 3
4

5 **2.1.3. Form and Function Together** 5

6 Based on the previous two sets of examples, one might suggest that artifact 6
7 names fall into two groups, with one set being extended based on function 7
8 and another based on form. However, there are several arguments against 8
9 this proposal. First, a single name can encompass some objects that are 9
10 related to the more typical examples via form and others via function. 10
11 Above, I noted that electric box fans and Japanese paper fans seem to 11
12 share a name because of their shared function of moving air to cool people. 12
13 However, other objects called *fan* function to suck water vapor, smoke, or 13
14 odors out of an area and are not intended to cool anything, such as a 14
15 ventilator fan in a bathroom and an exhaust fan in a stove hood. In this 15
16 case, the bladed objects (the box, ventilator, and exhaust fans) all seem to 16
17 warrant being called by the same name because of the physical resemblance 17
18 among them. Similarly, some things called *key* may come in disparate forms 18
19 that share a function, but others seem linked via the form. A radiator valve 19
20 key, for instance, resembles a metal door key but functions to turn a valve to 20
21 bleed air out of a radiator, and hex keys (see [http://www.radioshack.com/](http://www.radioshack.com/product/index.jsp?productId=2062781) 21
22 [product/index.jsp?productId=2062781](http://www.radioshack.com/product/index.jsp?productId=2062781), also known as hex wrenches) are 22
23 used to turn hexagonal bolts holding parts together in all sorts of devices. 23
24 Although most things called *knife* share some similarities of form, laser 24
25 knives overlap with typical knives on the current function but are physically 25
26 entirely distinct, with the laser beam as cutting device not the least of their 26
27 differences (see <http://www.freepatentsonline.com/4249533.html> for a 27
28 detailed description of the components of a laser knife). 28

29 Second, nouns sometimes seem to be extended to a particular object based 29
30 on resemblance on a combination of form and function. In such cases, the 30
31 overlap on each dimension with the more typical features associated with 31
32 the name may be only partial. For instance, things called *spoon* most often 32
33 have closed bowls for lifting liquid to the mouth to eat, but slotted spoons 33
34 have openings in the bowl, and pasta spoons have tines around the edge. 34
35 Both are for lifting something while leaving the liquid behind, and for 35
36 preparing rather than eating foods. Things called *chair* typically provide 36
37 backs, seats, and legs for sitting in while doing some task (eating, reading, 37
38 working, etc.) but massage chairs, dentist chairs, and electric chairs have 38
39 added elements for specialized functions. In the last two cases, it is an 39
40 external party that performs the task; the chair only serves to hold the 40
41 recipient of the task in place. Things called *blanket* typically are flat, flexible, 41
42 and made of breathable materials to cover a person for warmth, but picnic 42
43 blankets, while being flat and flexible, cover the ground for protection from 43
44 dirt, moisture, and insects and come in waterproofed versions. 44

1 Finally, even in cases where one dimension seems to be the dominant 1
2 basis for extending a particular artifact name, the general correlation 2
3 between form and function means that the two dimensions cannot be 3
4 fully dissociated. Where form differs, some difference in function usually 4
5 follows. Although the various objects called *rake* seem to be linked more by 5
6 form than by function, their similarity of form still makes their manner of 6
7 functioning more similar to one another than to, say, the manner of 7
8 functioning of the things called *brush* or *bowl*. Conversely, as Petroski 8
9 (1993) points out, the saying that form follows function is only loosely 9
10 true. The “general” in the statement that there is a general correlation 10
11 between form and function also has an implication for the cases where 11
12 function seems to be the dominant link among things called by a particular 12
13 artifact name. There are many different forms by which a general function 13
14 can be implemented, and names for artifacts acknowledge these differences. 14
15 It is impossible to characterize the functional boundaries of artifact names 15
16 without appealing to form in the process. Things called *chair*, *bench*, *stool*, and 16
17 *sofa* are all for sitting on, but it is the particular form they take that 17
18 distinguishes things called by each name from those called by another at 18
19 least as much as any finer discriminations of function. Even distinguishing 19
20 functions at a finer grain, shared function alone may not warrant use of a 20
21 name if the form differs from that usually associated with the name. For 21
22 instance, I observed the object shown in Figure 1 at a streetcar stop, used by 22
23 passengers to sit on while waiting for the streetcar, but several observers 23
24 have verified my intuition is that it is too unlike normal benches to readily 24
25 be called *bench*¹ (see Malt & Johnson, 1992; Hampton, Storms, Simmons, & 25
26 Huessen, in press, for more systematic evidence). Returning to broader 26
27 characterizations of function, many types of objects function to contain— 27
28 those called *box*, *basket*, *bin*, *crate*, *carton*, *bowl*, *bottle*, *jar*, and *jug*, for 28
29 instance—and so things called by each share a broad function of contain- 29
30 ment, but again it seems to be their material and/or shape that distinguish 30
31 them from one another as much as details of the function. Things called 31
32 *knife* are typically for cutting, but many other objects with other names are 32
33 also for cutting, including those called *pizza cutter*, *paper cutter*, *saw*, *wire* 33
34 *clippers*, *pruning shears*, *lopper*, *scissors*, *axe*, *sword*, *scalpel*, *machete*, and *scythe*. 34
35 Things called *key* may broadly be for opening and things called *blanket* for 35
36 covering, but those functions do not discriminate *key* from *can opener* or 36
37 *blanket* from *plastic wrap*. To narrow the function of each enough to dis- 37
38 criminate among them by function, the function statement inevitably ends 38
39 up entailing elements of form. A knife cuts by means of a single horizontally 39
40 oriented blade whereas a pizza cutter cuts by means of a round blade, scissors 40
41 cut by means of two blades that pass across each other, and so on. In the end, 41

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44 ¹ Names proposed by three respondents were *leaning rail* or *sitting rail*, *butt-rest* which could evolve to *buttress*, and *resting perch* or *person pedestal*. A fourth suggested *ergonomic bench*.

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Figure 1 This object has the function of things usually called *bench* but a form that falls outside the usual range associated with *bench*.

form seems to be integral to explaining what is *excluded* from being called by a certain name even when there is a strong component of shared function among things that *are* called by the name.

2.1.4. Conclusion Regarding Form and Function

Patterns of use of artifact names seem to entail overlap among the entities receiving a given name on both form and function. In some cases, the overlap between things receiving the same name may be most prominently on the dimension of function, and in other cases it may be most prominently on the dimension of form. However, it is difficult to find cases of artifact words where one could claim that function alone or form alone accounts for why the whole set of objects is called by a single name and why certain other objects are not called by that name. In one way or another, for any given artifact noun, it is most often necessary to appeal to both form and function to explain the full naming pattern.

2.2. How Can the Observed Instances and Patterns of Use be Accounted For?

By the focus so far, on form and function and the argument that both matter, it may sound like I am heading toward an argument for a “family resemblance” view of how artifact names are applied to objects. This is, of

1 course, the view that Rosch and Mervis proposed back in 1975, drawing on 1
2 Wittgenstein (1991; originally published in 1953) earlier analysis of the 2
3 range of things called by the name *game* (or, in reality, a roughly comparable 3
4 German term, *Spiele/Spiel*). In this view, an object can be called by a name 4
5 if it overlaps in its features with other things called by the same name, even if 5
6 it does not share any particular single feature or set of features with all other 6
7 things called by that name. As a general description of the relation of objects 7
8 to one another that are all called by the same name, it may not be far from 8
9 appropriate. However, this view fell out of favor among cognitive psychol- 9
10 ogists in the 1980s and thereafter, who, following Goodman (1972), became 10
11 concerned that it failed to explain what counted as “similar” (e.g., Murphy 11
12 & Medin, 1985) and failed to capture other important aspects of how people 12
13 thought about objects. Spurred in part by Putnam (1977) writings on 13
14 essentialism and Quine’s (1969) remarks about superficial versus deep simi- 14
15 larity within philosophy, psychologists turned their attention toward 15
16 people’s understanding of the more theoretical or causal connections 16
17 among features (e.g., Ahn, Kim, Lassaline, & Dennis, 2000; Murphy & 17
18 Medin, 1985) and to the possibility that there might be some single type of 18
19 knowledge or belief that more fully constrains what things can be called by a 19
20 name than the family resemblance view implies (e.g., Bloom, 1996; 20
21 Gelman, 2003; Keil, 1989; Medin & Ortony, 1989). 21

22 These later endeavors have brought to light many important aspects of 22
23 how humans relate to objects, including that they seek to understand causal 23
24 relations among object properties, they discriminate between more and less 24
25 projectable features in inferring unseen properties, and they consider an 25
26 object’s history as well as its current state in how they value it. But the 26
27 wording used in these investigations of conceptual activities tends to con- 27
28 flate the problem of accounting for how names are used to label objects with 28
29 their primary goal of characterizing people’s conceptual, nonlinguistic 29
30 understanding of entities in the world. The fact that Wittgenstein’s 30
31 famous analysis was actually of a German word, *Spiele/Spiel*, that is only 31
32 roughly equivalent to English *game* (see [http://en.wikipedia.org/wiki/](http://en.wikipedia.org/wiki/Philosophical_Investigations) 32
33 [Philosophical_Investigations](http://en.wikipedia.org/wiki/Philosophical_Investigations)) is rarely pointed out for the same reason that 33
34 my statement of Rosch and Mervis’ (1975) proposal is in fact slightly 34
35 inaccurate. Many cognitive psychologists writing about such topics in past 35
36 and recent decades, including Rosch and Mervis, have tended to frame their 36
37 topic in terms of *concepts* rather than names or word meanings *per se*. Thus 37
38 although Rosch and others (e.g., Murphy, 2002; Smith & Medin, 1981) 38 Au1
39 have used English words to identify concepts, they have more fundamen- 39
40 tally been interested in explaining the nature of nonlinguistic representa- 40
41 tions. The presumption that words directly reveal concepts is debatable 41
42 (e.g., Malt, Gennari, & Imai, in press; Wolff & Malt, in press), a point I will 42
43 take up later, but the blurring of the distinction has led to loss of interest in 43
44 family resemblance as it may apply to naming. For now, though, the key 44

1 point is that naming, as opposed to conceptualizing, is a linguistic phenom- 1
2 enon and must be considered in that context (Malt, Sloman, Gennari, 2
3 Shi, & Wang, 1999). 3

4 Returning, then, to how to characterize and explain naming patterns in 4
5 particular, the family resemblance view may have some merit as a general 5
6 description of the relations among things that get called by the same name, 6
7 although I will suggest a refinement of it below. Function has continued to 7
8 sometimes be taken as the “deeper” sort of property that constrains what 8
9 things will be called by the same name and/or be part of the same concept 9
10 (e.g., Asher & Kemler Nelson, 2008; Kemler Nelson, Herron, & Morris, 10
11 2002). As the earlier discussion indicates, though, the names actually applied 11
12 to objects in everyday language use do not support this idea. The other chief 12
13 contender for a possible constraint on artifact naming has been creator’s 13
14 intended category membership (Bloom, 1996; Gutheil, Bloom, 14
15 Valderrama, & Freedman, 2004). According to this idea, an artifact’s cate- 15
16 gory membership, and therefore its name, will be whatever its creator 16
17 intended it to be. Although creator’s intention can indeed have an impor- 17
18 tant influence on artifact naming patterns, as I will discuss later, it is unlikely 18
19 that it fully constrains what things a person tends to call by a given name. 19
20 Creator’s intention is often unknown at the moment of using a name for an 20
21 object (see Malt & Johnson, 1998). Differences between languages in which 21
22 objects share the same name, which I will document later, would also pose a 22
23 problem for trying to infer intention: Depending on who the creator was, 23
24 the intended category may not be that which the current speaker would 24
25 infer. And, empirically, current uses that differ from the original intention 25
26 have some impact on name choice for artifacts (Malt & Sloman, 2007b; 26
27 Siegel & Callanan, 2007). Although often worded in terms of artifact 27
28 naming, this proposal has, ultimately, been deemed a view of concepts 28
29 rather than of naming (Bloom, 2007). In the end, then, it seems likely 29
30 that there is no single type of feature or dimension that places a strong 30
31 constraint on what things can be called by a given artifact name. 31

32 Even if something along the lines of a family resemblance characteriza- 32
33 tion is suitable, though, it is not very satisfying from an explanatory per- 33
34 spective. It does not reveal anything about how such naming patterns come 34
35 about. If there needs to be only partial overlap on some dimensions with 35
36 some other things called by a name, but not on any particular dimension or 36
37 with any particular object, in order for an object to be called by the same 37
38 name as certain other objects, then how does an object come to have one 38
39 name and not an alternative? For instance, why aren’t brooms and dusters 39
40 called *brush*? Why aren’t scalpels and scythes called *knife*, or putty and 40
41 frosting knives called *spatula* or *spreader*? It also does not reveal anything 41
42 about how the names can usefully serve language production and compre- 42
43 hension purposes. When someone hears *brush*, how does she manage to 43
44 interpret it appropriately, if the intended referent can vary so greatly? 44

1 A more satisfying account of artifact naming patterns needs to say more than 1
2 just that objects called by the same name have a family resemblance among 2
3 them. Next, I suggest two key elements of a more complete perspective on 3
4 how artifact naming patterns come about. These elements follow from 4
5 taking seriously the distinction between naming as a linguistic process and 5
6 conceptual, nonlinguistic aspects of how people understand artifacts. 6

7 8 9 **2.2.1. Naming Patterns Are the Result of Diachronic, Not Just Synchronic, Processes**

10 Some attention has been paid in the concepts literature to the types of 10
11 sortings that people produce if they are asked to place sets of novel objects 11
12 into groups. Participants tend to produce unidimensional sorts (e.g., Medin, 12
13 Wattenmaker, & Hampson, 1987), although they will also produce family 13
14 resemblance sorts under some conditions (Regehr & Brooks, 1995). But 14
15 regardless, naming in real-world settings is not a result of seeing an array of 15
16 objects all at once and trying to figure out how best to partition them to 16
17 maximize resemblance within the groups. When naming an object, each 17
18 speaker makes a choice about what name to apply from among those in her 18
19 vocabulary, but those choices are constrained by the naming patterns she 19
20 acquired from her elders, whose input shaped the child's lexical choices to 20
21 match their own conventions (Chouinard & Clark, 2003). Theirs in turn 21
22 were constrained by ones they were exposed to during their own language 22
23 acquisition. Because naming patterns are passed down from one generation 23
24 of speakers to another, they are the product of processes operating over 24
25 historical time, just as are syntax, phonology, and other aspects of language 25
26 (e.g., Hock, 1991; Traugott & Dasher, 2005). When a new object enters a 26
27 culture and needs to be named, the name it receives must depend on what 27
28 other objects existed at that time within the culture and what contrasts 28
29 among them were distinguished by name at that time. The latter would 29
30 have been influenced by, among other things, contact with other languages, 30
31 which can be a significant source of addition to a language's vocabulary and 31
32 an impetus for restructuring of semantic space to avoid synonymy (e.g., 32
33 Clark, 2007; Millar, 2007). In short, the set of objects that come to share a 33
34 name will depend on the order of input of each to the naming process and 34
35 the existing landscape of names within the language² at the time the object 35
36 entered the culture. 36

37 As a result of the order- and time-dependent process, chains may form 37
38 where each link in the chain is motivated at the time it occurs, although 38
39 the connection between distant elements of the chain may later be hard to 39
40

41
42 ² Most languages encompass several or more dialects or variations used by sub-communities of languages users, 42
43 and naming patterns may differ across these. For brevity, I will refer to "languages" but this term should more 43
44 accurately be interpreted as meaning some specified group's version of the language. See, for instance, 44
Kempton's (1981) discussion of subcultural variation in use of Spanish pottery terms.

1 see. Alexander Graham Bell's early telephone evolved year by year into 1
2 more advanced objects having new forms, new modes of voice transmis- 2
3 sion, and greater capabilities. The corded phone spawned cordless phones, 3
4 and those spawned cell phones, and now there is the "smart" cell phone 4
5 with astonishing capabilities unrelated to the original function of transmit- 5
6 ting voices across distance. (See Lakoff, 1987, for examples of chaining for 6
7 word classes other than nouns.) Where someone to sort pieces of commu- 7
8 nication technology from across history without knowing the evolutionary 8
9 paths among them, they might tend to group the early phone with a 9
10 telegraph machine and the modern smart phone with a computer, but 10
11 that is not how the names used for each came to be. (See Petroski, 1993, 11
12 for an interesting discussion of how knives and forks changed over time, 12
13 shifting functions to the extent that the fork took over the knife's original 13
14 function of bringing food to the mouth by spearing or heaping it on the 14
15 blade surface.) These sorts of phenomena are better approximated by 15
16 laboratory categorization models that permit order-dependent construction 16
17 of clusters (e.g., Heit, 1992; Love, Medin, & Gureckis, 2004) rather than by 17
18 the majority which assume simultaneous consideration of all exemplars in 18
19 creating groups. 19

20 Because naming patterns are established over historical time, they, not 20
21 only their referents, also evolve. Elements of the chain can drop from 21 Au2
22 current knowledge, making naming choices nontransparent to current 22
23 speakers. For instance, it is hard to imagine why milk, eggs, ice cream, 23
24 and cigarettes (and, for some people, yogurt and cottage cheese) all come in 24
25 containers called *carton* when the forms and specialized functions of these 25
26 containers are so different. The answer seems to be that it is because *carton* 26
27 used to refer to containers made out of a certain material (pasteboard) 27
28 (Oxford English Dictionary on-line [http://dictionary.oed.com/entrance.](http://dictionary.oed.com/entrance.dtl) 28
29 [dtl](http://dictionary.oed.com/entrance.dtl)). As time passed and the material shifted to plastic or foam for some 29
30 products, the name nevertheless remained the same, making its use non- 30
31 transparent to current speakers. Someone once suggested to me that *carton* 31
32 refers to containers holding fixed quantities, such as a gallon or a dozen. 32
33 There appears to be no truth to this conjecture but it illustrates the extent to 33
34 which current speakers have lost a sense of the original motivation. In sum, 34
35 it is impossible to understand how artifacts are named without considering 35
36 diachronic as well as synchronic processes. 36
37

38 2.2.2. Production and Comprehension Involve Social Processes, 39 Not Just Individual Ones

40 The second key to understanding artifact naming patterns is to consider the 40
41 social nature of language use. Individuals doing things alone don't need 41
42 language. Language exists for social purposes; it helps accomplish activities 42
43 such as sharing information, planning joint activities, teaching and learning, 43
44 entertaining, and so on. Thus language use entails individual acts that are 44

1 performed as part of joint action (Clark, 1996). There are at least two aspects 1
2 of the social nature of language that help explain how artifact naming 2
3 patterns come about and how communication can be successful despite 3
4 the complexity of name uses. First, naming is goal-driven, and second, 4
5 speakers and addressees work together. 5
6

7 **2.2.2.1. Naming is Goal-Driven** Naming is goal-driven, both in terms of 7
8 the enduring patterns of usage that are adhered to across many contexts, and 8
9 in terms of the choices that are made on the spot in a given context when 9
10 more than one name is possible for an object. A central goal of naming in 10
11 ordinary discourse is to refer (meaning, when writing, for the writer to get 11
12 the addressee to understand what kind of thing she has in mind; when 12
13 speaking, if referents are physically present, to get the addressee to success- 13
14 fully pick out the intended referent from among possible ones). But naming 14
15 can have other goals as well, as such as conveying affect or focusing attention 15
16 on certain attributes of the object. Calling a building *hut* versus *hovel*, or 16
17 *house* versus *McMansion*, highlights different properties of the objects and 17
18 indicates something about the speaker's attitude about the object (Malt & 18
19 Sloman, 2007b). Within a particular interaction, the name chosen may 19
20 depend on the immediate goals of the speaker as far as what attributes to 20
21 highlight or attitude to convey (Malt & Sloman). Across the longer term, 21
22 names for novel objects are often proposed by the manufacturer or marketer 22
23 of the object and then adopted into general use by the public. The name the 23
24 manufacturer or marketer puts forward is likely to be carefully designed to 24
25 highlight certain attributes (and even encourage the adoption of certain 25
26 attitudes) by either affiliating the object with those called by an existing 26
27 name or by contrasting it with them. For instance, plastic juice boxes, even 27
28 when shaped like a bear (see Malt et al., 1999 for illustration) presumably 28
29 were labeled *box* to emphasize their potential as a replacement for a dispos- 29
30 able juice box. The basket-maker Longaberger has labeled a wide variety of 30
31 products as *basket* that might otherwise be called *tote*, *woven bag*, *handbag*, *bin*, 31
32 or *hamper* (see <http://www.longaberger.com/ourProducts.aspx>) presum- 32
33 ably to highlight their affiliation with the Longaberger material and style. 33
34 On the other hand, the new name *spork* was spawned (and is now used by a 34
35 number of manufacturers; see, e.g., <http://en.wikipedia.org/wiki/Spork>) 35
36 presumably to contrast with both spoons and forks and highlight the ability 36
37 of the new type of object to perform as both. The name was chosen even 37
38 though the deviation of sporks from typical spoons is no greater than from, 38
39 say, a grapefruit *spoon* with a serrated edge for cutting and no greater from 39
40 typical forks than, say, a fish-serving fork. *Scork* has followed, the only 40
41 motivation for the contrasting name apparently being the desire to signal 41
42 the incorporation of a can opener into the handle design (see http://www.gearforadventure.com/Vargo_Stainless_Steel_Scork_p/1480.htm). Such goals 42
43 can result in object names that deviate from those that would be constructed 43
44

1 if an array of objects were simply sorted into groups according to some 1
2 generic similarity metric. 2

3
4 **2.2.2.2. Speakers and Addressees Work Together** Speakers and 4
5 addressees work together to ensure that the intended message of an utterance 5
6 is interpreted as it was meant to be (e.g., Clark, 1996, 2006). As Clark 6
7 (1996) points out, language evolved in the context of face-to-face commu- 7
8 nication; conversation is its most basic and universal form. Comprehension 8
9 is aided by the active engagement of parties in the interaction, occurring 9
10 most readily in conversation but with similar processes carrying over to 10
11 written discourse. 11

12 One such process or device that has been proposed is the use of common 12
13 ground (e.g., Clark, 1996, 1998; Clark & Marshall, 1981), whereby the 13
14 parties to a discourse exploit what they know about what each other knows 14
15 to choose their words and help guide their interpretation of the others' 15
16 words. This common ground can include precedents established between 16
17 them in the course of their interactions (e.g., Clark & Brennan, 1991; 17
18 Clark & Wilkes-Gibbs, 1986). So, for instance, if one person has referred 18
19 to her Longaberger purchase as her new *basket*, her conversational partner is 19
20 likely to call it *the basket* in return (and not *the tote* or *the woven bag*), knowing 20
21 that this is the term that picks out for her friend the item they intend to 21
22 discuss. There has been some debate over exactly how to describe the kinds 22
23 of processes underlie adherence to conversational precedents (e.g., 23
24 Horton & Gerrig, 2005a,b; Shintel & Keysar, 2009). Regardless of details, 24
25 it is inevitable that common ground and conversational precedents are 25
26 exploited in designing utterances. Adults adjust their vocabulary in speech 26
27 to children and teachers do to learners, individuals take into account which 27
28 of their language subcommunities (fellow surgeons, fellow dance enthusiasts, 28
29 or fellow South Dakotans) they are addressing (Clark, 1998), and speakers 29
30 can track what names have been used with what conversational partners 30
31 within the bounds set by normal memory limitations (Horton & Gerrig). 31

32 Other devices are also available to help in coordination. In conversation, 32
33 the role of speaker and of addressee usually alternates frequently, which 33
34 helps achieve mutual understanding as each can monitor and correct the 34
35 interpretations of the other. Addressees indicate their interpretation of 35
36 information through questions or comments (“Yes, I see” or “This one, 36
37 right?”) as well as through nods, facial expressions (satisfied, surprised, 37
38 quizzical, etc.) and movements such as picking up an object or gesturing 38
39 or moving toward it (e.g., Barr, 2003; Clark, 1996; Clark & Brennan, 1991; 39
40 Clark & Fox Tree, 2002; Clark & Krych, 2004; Kelly, Barr, Church, & 40
41 Lynch, 1999). Speakers and addressees go through an iterative process in 41
42 which the participants repair, expand on, or replace a referring expression 42
43 until they reach a version they mutually accept (Clark & Brennan; Clark & 43
44 Schaefer, 1989; Clark & Wilkes-Gibbs, 1986), and speakers may even 44

1 correct interpretations regardless of whether addressees request further 1
2 information. For instance, when an instruction to pick up an object is 2
3 ambiguous about the intended referent, there is often a further interaction 3
4 to refine interpretation, with listeners either asking for clarification or else 4
5 reaching for an object and then being corrected by the speaker (or both) 5
6 (e.g., Barr & Keysar, 2005; Clark & Wilkes-Gibbs). Speakers also produce 6
7 signals in their speech stream that help addressees differentiate among 7
8 potential object referents. When speakers formulate descriptions of new 8
9 referents, their utterances contain longer hesitations and are more likely to 9
10 contain a filled pause (such as “ummm”) (Barr, 2003), and other flags such 10
11 as pronouncing *the* as THEE rather than THUH (Arnold, Tanenhaus, 11
12 Altmann, & Fagnano, 2004). Addressees are able to make use of these 12
13 speech patterns to help narrow in on intended referents; when they heard 13
14 a description of a new referent preceded by such signals, they are better at 14
15 understanding the description than when such signals are not available 15
16 (Arnold et al.; Barr). 16

17 Finally, when an addressee is faced with interpreting a bare noun such as 17
18 *basket* or *brush* or *box* that can refer to objects having any of a range of forms 18
19 and functions, it may be because there is only one potential referent present 19
20 or the target referent is salient enough to easily be identified (Clark, 1996). 20
21 When more than one possible referent is present (or could be imagined, in 21
22 text), speakers (or writers) disambiguate by adding modifiers (Brennan & 22
23 Clark, 1996). Although *brush* by itself can refer to many different sorts of 23
24 objects, the longer expressions *paint brush*, *hair brush*, *scrub brush*, or *basting* 24
25 *brush* narrow the relevant properties substantially. In subsequent utterances, 25
26 the object can be referred to simply as *brush* once a mutual understanding has 26
27 been achieved. Children produce and accurately interpret such modifier- 27
28 noun expressions by 2–3 years of age (Clark & Berman, 1987; Clark, 28
29 Gelman, & Lane, 1985), demonstrating the ease of use of such expressions. 29
30 Thus, through a variety of devices, an addressee’s interpretation is heavily 30
31 scaffolded by the speaker who is actively engaged in helping her arrive at the 31
32 understanding he intended. 32
33 33

34 2.2.3. Conclusion Regarding How to Explain 34 35 Artifact Naming Patterns 35

36 At a general level, uses of artifact names may be described by the family 36
37 resemblance idea of an object needing only some degree of overlap with 37
38 other things called by the same name. Understanding why this family 38
39 resemblance pattern comes about, though, requires digging deeper into an 39
40 understanding of how naming patterns come about. Historical linguistic 40
41 processes are key to this understanding, and they can produce chains of 41
42 linked uses. Despite the looseness of such a system, it affords communica- 42
43 tion without problems because the inherently social nature of communica- 43
44 tion provides the necessary support. Addressees are not left on their own to 44

1 figure out the intended meaning of ambiguous nouns; many social, linguistic, 1
2 and paralinguistic forms of assistance are provided by speakers (and, in 2
3 more limited ways, by writers). 3
4
5

3. INTERPRETATION ISSUES

6
7
8 In this section, I will address several questions about the interpretation 8
9 of the naming observations used as motivation for my arguments. These 9
10 questions ask, from several different perspectives, whether artifact name use 10
11 could look simpler and less in need of appeal to diachronic and social 11
12 processes by adopting certain constraints on the words or objects being 12
13 considered. I will argue that the answer is *no* in each case. 13
14
15

3.1. Does Function Fully Constrain *Some* Artifact Names?

16
17
18 Many of the nouns that have been used in the examples so far are non- 18
19 transparent in their names. *Chair* or *basket* or *carton* contains no morphemes 19
20 within them that hint at a meaning or range of application. Some names for 20
21 artifacts, though, contain meaningful units that might specify a particular 21
22 function. For instance, given some understanding of *tooth* and *brush*, *tooth-* 22
23 *brush* seems to tell us that the word applies to things for brushing teeth, and 23
24 given some understanding of *tooth* and *pick*, *toothpick* seems to tell us that the 24
25 word applies to things for picking teeth. Some, perhaps many, nouns of this 25
26 sort do seem fairly well constrained in their range of application by the 26
27 function implied by their name. *Doorstop* may be used only for objects that 27
28 stop doors, and *headrest* may be used only for things that heads are rested on. 28

29 But the first two examples illustrate that such nouns need not always 29
30 obey a strong functional constraint. Things named *toothbrush* are certainly 30
31 for the most part made and bought for purposes of brushing teeth. Tooth- 31
32 brushes make good cleaning tools, though, and one company now makes 32
33 and markets a set of objects they call *toothbrushes* specifically for use in house 33
34 cleaning, even offering them in professional cleaner's grade, and advertised 34
35 with the exclamation "Definitely not for your teeth!" (see http://www.thecleanteam.com/catalog_f.cfm). Even more compellingly, *toothpick* origi- 35
36 nally did label an object made and bought for picking teeth (Petroski, 36
37 2007), but today the dominant reason for the making and buying of objects 37
38 called *toothpick* (at least in the U.S.) is a different one: to use to spear cheese 38
39 cubes and other canapés and bring them to the mouth for eating. In many 39
40 social circles, using them to actually pick the teeth would be considered 40
41 poor manners. That these objects, so named, are created (not just used) for 41
42 the eating purpose is verified by the wide range of decorative toothpicks 42
43 available for party platters, and by their positioning with kitchen wares and 43
44 44

1 party supplies in merchandising. In fact, some toothpicks are now sold 1
2 purely as decorations; one manufacturer offers American flag toothpicks 2
3 to place on cakes and other desserts for Independence Day. As these 3
4 examples illustrate, artifact names of this sort most likely start out with a 4
5 range of application that is well described by a particular function. How- 5
6 ever, it seems that even in these cases, they can break loose from their 6
7 origins and acquire a wider range that is not limited by a single function. 7
8 Perhaps this should not be entirely surprising, since it has been observed in 8
9 other contexts that transparent elements of meaning can be combined with 9
10 others that violate them. We talk about plastic silverware, jumbo shrimp, 10
11 working vacations, loose tights, white chocolate, and small fortunes 11
12 (Lederer, 1989) without any problem. 12

13 Another candidate for being more fully constrained by function might 13
14 be agentive nouns. In English, the suffixes “-er” and “or” are used with 14
15 some frequency to form nouns that denote the doer or performer of an 15
16 action (e.g., Finegan, 1994). For instance, *baker* is composed of *bake* + *-er* 16
17 and refers to a person who bakes, and *runner* is composed of *run* + *er* and 17
18 refers to one who runs. Although agentive nouns are usually discussed with 18
19 reference to animate agents as in the preceding examples, they also can be 19
20 formed to name inanimate objects that are used to accomplish some sort of 20
21 act. So, for instance, *dryer*, *container*, and *hanger* are artifact nouns of this sort, 21
22 that name, at least prototypically, objects used for drying, containing, and 22
23 hanging, respectively. Given the nature of the names, one might wonder 23
24 whether the usage of this sort of artifact noun is more fully constrained by 24
25 function than the nouns we have been discussing to this point. That is, does 25
26 the range of application of *dryer*, *container*, and *hanger* get fully determined by 26
27 a single, specifiable function (to dry, to contain, and to hang)? As with the 27
28 preceding case, there seem to be few counterexamples in which an agentive 28
29 noun name is routinely used to name an object not intended to fulfill the 29
30 function suggested by its name. But even so, again, this strong tendency is 30
31 not absolute. Consider brightly colored objects called *pipe cleaners*, made and 31
32 sold for use in children’s crafts (e.g., http://www.discountschoolsupply.com/Product/ProductList.aspx?category=89&es=553020000G&CMP=KNC-Google&s_kwcid=TC|10010|pipe%20cleaner%20crafts||S||3019930373&gclid=CKjnhfDl8ZwCFcFD5god8lfObQ). Their craft use has no 32
33 resemblance to pipe cleaning (or any sort of cleaning), indicating that the 33
34 name can break loose from the function it originally implied. Furthermore, 34
35 note that even when uses are consistent with the name, the function 35
36 suggested by the name only partially constrains the range of objects to 36
37 which the name is applied. *Duster* and *dustcloth* are applied to different 37
38 types of objects although both are for dusting (a duster usually having a 38
39 handle with feathers or lambswool, etc., attached). *Cleaner* and *cleanser* are 39
40 also applied to different types of objects although both are for cleaning 40
41 (cleaners usually being nonabrasive as in *silver cleaner* or *glass cleaner*, and 41
42 42
43 43
44 44

1 cleansers being gritty), and likewise *mixer* and *blender* are although both are 1
2 for thoroughly combining food ingredients (mixers usually having an open 2
3 bowl with beater blades and blenders having a more vertical container with 3
4 a chopping blade). Even *doorstop* and *door stopper*, so minimally different, 4
5 imply different forms although they both function to hold doors open 5
6 (a doorstop usually being a heavy form placed against the door, and a 6
7 door stopper being plastic or rubber and wedged under the door). Thus 7
8 these agentive names still integrally require reference to elements of form in 8
9 order to describe the range of referents to which they apply. Having a 9
10 particular function revealed by the name may usually (though not always) be 10
11 a necessary condition for application of an agentive noun but even then, it is 11
12 not sufficient. 12

13 One could argue that these agentive names are distinguished by the finer 13
14 details of the function and so are still truly function-defined (even if the details 14
15 are not transparent in their name). As with nonagentive nouns, though, the 15
16 specifics of function can vary among things called by the same agentive name, 16
17 making it impossible to describe function at a detailed level and encompass all 17
18 objects that do get labeled by the name. For instance, *computer* and *calculator* 18
19 are distinguished by both form and the specifics of the kinds of calculations 19
20 they can carry out, but earlier computers could only perform at the level of 20
21 today's calculators (or even *abacuses*, before that), and tomorrow's computers 21
22 will have new capabilities. In general, objects that change rapidly with 22
23 advancing technology will encompass fairly wide ranges of functions as 23
24 well as forms (e.g., *scooter*, from a child's two-wheeled, muscle-propelled 24
25 toy to electric versions that transport disabled adults; *cash register* from 25
26 mechanical to digital versions that generate coupons and track product sales 26
27 as well as make change). Again, it seems that function may come closer to 27
28 constraining the range of application of these names but it still is only a partial 28
29 constraint. Highly specific functions may appear more sufficient for distin- 29
30 guishing between pairs such as *computer* and *calculator*, but then they are 30
31 unlikely to be truly necessary for all uses of the words. 31
32

32 33 34 35 36 37 38 39 40 41 42 43 44

3.2. Is the Apparent Complexity of Artifact Name Use Only Because of Polysemy?

36 Even setting aside homonymy, most words have a network of related senses 36
37 (e.g., Nerlich, Todd, Herman, & Clarke, 2003). In some cases, these senses 37
38 can be quite disparate although still having transparent connections, such as 38
39 in the meanings of *nose* that include a facial organ, an olfactory attribute of 39
40 wine, and an ability to detect (as in *She has a good nose for this*) (Nerlich & 40
41 Clarke, 2003). These senses of *nose* are so different from each other that 41
42 it seems meaningless, or least foolhardy, to even ask if there is any simple 42
43 account of the meanings that can be articulated in terms of a shared 43
44 constraint on what the term *nose* applies to. The range of things that *nose* 44

1 applies to, and how one would describe that range, might become more
2 tractable and meaningful if we limit the referents under consideration to
3 concrete objects. Then it is a matter of explaining why *nose* applies to
4 people, dogs, birds, airplanes, rockets, etc.—still not a simple task but
5 presumably a more manageable one that might have a better chance of
6 yielding some straightforward constraint. One might wonder if the case of
7 artifact terms would look a great deal simpler if we divided off some
8 examples as entailing distinct senses and tried to account for only one
9 sense at a time. For instance, does *box* in reference to plastic boxes with
10 snap lids or *fork* in reference to fish-serving forks reflect different senses than
11 when the words refer to more typical examples? The difficulty with this
12 strategy is finding a motivated way to restrict the set of referents that should
13 count as falling under one sense. I have already limited the cases under
14 consideration to concrete referents and uses that do not seem to involve
15 metaphor, metonymy, or any other such extension device. If some of the
16 examples discussed to this point constitute separate senses of the words
17 because they seem to invoke different attributes, then all of them do.
18 Alternatively, if we were to try to specify what will count as the separate
19 major concrete-object senses of a word such as *box* by, say, taking a single
20 form or function as the diagnostic criterion, then the argument becomes
21 circular. Naturally, if the range of examples to be explained is restricted
22 according to some *a priori* criteria for the properties they can have, then they
23 will all share these properties. In the end, it is hard to provide any objective
24 criterion for separating any collection of concrete-object uses from any
25 other (see Nunberg, 2004, for a related argument).

28 3.3. Is the Apparent Complexity of Artifact Name Use Only 29 Because of Compounding or Conceptual Combination? 30

31 As noted earlier, some of the artifact names I have discussed contain more
32 than one morpheme. Some, such as *toothbrush*, are commonly written as a
33 single word. Others are often (*hair brush*) or always (*scrub brush*) written as
34 two words. All of these cases are potentially noun compounds, which are
35 considered morphologically complex single words rather than nouns
36 phrases consisting of a head noun and modifying noun or adjective. The
37 classification is generally made based on the stress pattern. Compound
38 nouns are said to resemble unanalyzable (monomorphemic) nouns (such
39 as *table* or *garbage*) in having the primary stress on the first element of the
40 compound, whereas noun phrases have primary stress on the last lexical
41 element (e.g., Bybee, 1985; Pinker, 1994). For instance, this difference is
42 illustrated by the stress patterns of *Bluebird*³ and *blackboard* (compounds)

43
44 ³ Names of species are capitalized following the convention in ornithology.

1 compared to blue *bird* and black *board* (noun phrases) (e.g., Finegan, 1994). 1
2 If things called *toothbrush*, *hair brush*, or *scrub brush* are not examples of the 2
3 name *brush* by itself, but are separate words, then perhaps the range of 3
4 referents of *brush* itself is not as variable as I have suggested. A related 4
5 argument might be made from the perspective of psychologists who study 5
6 conceptual combination (e.g., Hampton, 1997; Murphy, 1990; 6
7 Wisniewski, 1997). If several concepts (labeled by nouns and adjectives) 7
8 are put together to form new concepts, perhaps the terms that result should 8
9 be considered to pick out some set of things that are distinct from those 9
10 labeled by the head noun. For instance, *chocolate bee*, when used to refer to a 10
11 piece of chocolate shaped like a bee, names something that lacks all the 11
12 behavioral properties and almost all internal and external form properties of 12
13 the majority of things called *bee*. Intuition suggests this sort of thing might 13
14 not be considered an example of the noun *bee* by itself. 14

15 Two points argue against adopting these positions to exclude some 15
16 concrete-object examples from consideration. First, although some com- 16
17 pounds may be coined to label things that don't comfortably fit among 17
18 other things labeled by their head noun, others do label things that are 18
19 moderately to highly typical of the head noun alone. For instance, *shoe box*, 19
20 *hair brush*, *paint brush*, *Coke bottle*, *tea cup*, and *baby shoe* would all be counted 20
21 as conventional combinations having the signature stress on the first word of 21
22 the phrase. However, they name things that are perfectly reasonable as 22
23 examples of the bare nouns and can comfortably be referred to by *box*, 23
24 *brush*, *bottle*, *cup*, or *shoe* alone. If this is true, one might wonder why the 24
25 compound occurs with some frequency in reference to these objects rather 25
26 than just labeling them with the bare noun. It may be that the routine use of 26
27 the modifier (resulting in the status of the phrases as familiar compounds) 27
28 functions simply to identify distinctive properties of the objects against a 28
29 field of potential referents that is highly variable. 29

30 Second, despite the widespread appeal to stress patterns to distinguish 30
31 between compounds and noun phrases, this diagnostic test is substantially 31
32 less valid than is usually assumed (e.g., Plag, Kunter, & Lappe, 2007; Plag, 32
33 Kunter, Lappe, & Braun, 2008). For instance, the stress is on the right-hand 33
34 element in *chocolate donut*, *apple pie*, *paper doll*, *silk tie*, and *aluminum foil*. For 34
35 names of street-like passageways, the stress pattern varies depending on the 35
36 right-hand element; thus *Green Street* is similar to *Bluebird*, but *Green* 36
37 *Avenue*, *Green Boulevard*, and *Green Parkway* all have stress on the second 37
38 constituent. (I note that even for color terms in bird names, variability from 38
39 the often-cited *Bluebird* pattern exists: *Black Phoebe*, *Yellow Rail*, *Green* 39
40 *Heron*, and among the blues, *Blue Mockingbird*, *Blue Grosbeak*, and *Great* 40
41 *Blue Heron*.) There is even variation among native-speaker informants in 41
42 stress assignment, and variation can be induced by the sentence context 42
43 (Pennanen, 1980). A number of variables including argument structure, 43
44 semantic relation between the first and second constituent, frequency of the 44

1 combination, and analogy to other combinations sharing the same head 1
2 noun all have predictive value for the stress on a given combination, with 2
3 none providing an absolute rule (Plag et al.). Thus, the message from stress 3
4 patterns about what should count as a compound versus as a “mere” 4
5 modifier-noun phrase is unclear. If the stress pattern test does not hold up, 5
6 from a practical perspective, it is hard to know how to decide what is a 6
7 compound and what is not. From a psychological perspective, maybe there 7
8 is simply a gradient of conventionality, with the more familiar, frequently 8
9 used combinations feeling like compounds and less common ones feeling 9
10 like modifier-plus-noun phrases. In that case, there is no principled distinc- 10
11 tion to appeal to in deciding whether multimorphemic names do or do not 11
12 label objects that count as examples of a given bare noun. In fact, if the more 12
13 lexicalized modifier-noun combinations are the more frequently used ones, 13
14 they are also likely to include some naming the most common referents of 14
15 the noun (e.g., as in the *shoe box* and *hairbrush*, etc.), which argues against 15
16 lexicalization as an indicator of names that should be treated as distinct from 16
17 instances of the head noun alone. 17
18
19

20 3.4. Conclusion Regarding Interpretation Issues 20

21 Complexity of naming patterns is pervasive for nouns used to label artifacts, 21
22 although it varies across noun types. Nouns that are transparently composed 22
23 of several morphemes, including agentive nouns, may tend to stray less in 23
24 their usage from that implied by the meaning of their constituents. Even in 24
25 those cases, though, the constraints are not absolute, reinforcing the possi- 25
26 bility that virtually any artifact noun has the potential to develop a range of 26
27 uses that overlap with one another on different dimensions. This conclusion 27
28 is not readily explained away by trying to limit the range of exemplars that 28
29 should count in the analysis of a given name, because principled bases for 29
30 limitations are lacking. 30
31
32
33

34 4. IMPLICATIONS OF ARTIFACT NAMING PATTERNS 34 35 FOR OTHER ASPECTS OF HUMAN COGNITION 35

36
37
38 The points made so far have implications for understanding aspects of 38
39 cognition beyond how people use English nouns. In this section, I will 39
40 consider how the naming issues relate to views of artifact categorization, 40
41 how English naming patterns relate to those of other languages, and how 41
42 the cross-linguistic variability that exists impacts word learning by children 42
43 and by those learning two or more languages (either from birth or as 43
44 second-language learners later in life). I end this section by returning to 44

1 how naming and nonlinguistic thought are related, this time considering the 1
2 questions raised by the documented cross-linguistic variation. 2
3

4 4.1. Implications for Views of Artifact Categorization 4 5

6 As alluded to earlier, a large number of studies over the past several decades 6
7 have addressed questions about how adults and children categorize artifacts. 7
8 One major line of inquiry has been about how adults make artifact category 8
9 decisions—whether they are based on the form, original (intended) func- 9
10 tion, or current function of an object, the creator’s intended category 10
11 membership, or some combination of these factors. A second major line 11
12 has asked whether there is a developmental progression from one basis to 12
13 another. The latter studies have focused on whether children move from 13
14 form- to function-based categorization or whether they are oriented to 14
15 function from early on. In both the adult and developmental literatures, 15
16 original, intended function and creator’s intended category membership 16
17 have generally been taken as use of “deep” properties over more superficial 17
18 ones and sometimes cast in terms of psychological essentialism, the notion 18
19 that people seek some underlying trait that determines an entity’s kind 19
20 (Bloom, 1996; Medin & Ortony, 1989). The debates over the various 20
21 possibilities have been extensive, but they have not resulted in convergence 21
22 on final answers. Original, intended function and creator’s intended cate- 22
23 gory membership are often found to have strong pull in the answers 23
24 that both children and adults give to questions about what an object is 24
25 (e.g., Bloom; Diesendruck, Markson, & Bloom, 2003; Kemler Nelson 25
26 et al., 2002; Rips, 1989), but some studies have found contributions of (or 26
27 domination by) current function or form (e.g., Estes, 2003; Hampton et al., 27
28 in press; Landau, Smith, & Jones, 1988; Malt & Johnson, 1992; Siegel & 28
29 Callanan, 2007). Methodological differences in the types of stimuli used and 29
30 how the judgments are posed to participants may contribute to the varying 30
31 results (e.g., Diesendruck et al.; Kemler Nelson et al., 2000; Malt & Sloman, 31
32 2007a). But there is also a theoretical muddying of the issues that contributes 32
33 to the lack of resolution. Defeyter, Hearing, and German (2009) remark that 33
34 research often has not distinguished clearly between the question of how 34
35 people categorize something and the question of to what extent they focus 35
36 on original or current function of an artifact when trying to understand a 36
37 novel object. Following from my earlier argument, I would suggest that the 37
38 confusion goes deeper than this. The research overlooks the difference 38
39 between naming and how people might understand or group objects concep- 39
40 tually (Malt & Sloman, 2007a). Measures of artifact categorization are 40
41 most often measures of the name chosen for an object, usually in a forced- 41
42 choice task. The observations I have described make clear that the question 42
43 of how the name for a given artifact is determined does not have a simple 43
44 pick-one-factor answer, and so it is not surprising that results have been 44

1 mixed. In fact, it will not be possible to get an accurate picture of patterns of 1
2 artifact naming in the real world through tasks that tap only synchronic 2
3 variables, because such tasks eliminate many of the forces that actually 3
4 influence naming that I described earlier (such as cultural history, the impact 4
5 of word borrowings from other languages and subsequent reorganization of 5
6 semantic space, and marketing goals). 6

7 Once the distinction between naming and nonlinguistic understanding of 7
8 objects is appreciated, it is easier to make sense how the factors studied may 8
9 play in these processes. Many researchers who use naming as their dependent 9
10 measure are actually most concerned with how people think about and 10
11 conceptually group objects (e.g., Bloom, 2007). Despite the relevance of 11
12 form in establishing naming patterns, affording a use is the main reason that 12
13 artifacts exist. It is natural that function is primarily what people seek to 13
14 understand when encountering a novel artifact, that function may be a 14
15 dominant basis for grouping artifacts conceptually, and that whether original, 15
16 intended function or current use is more salient can vary depending on the 16
17 context in which the object is encountered. It is also natural to want to know 17
18 what use the original creator intended for object, because knowing that often 18
19 reveals what the best use of the object is. Conversely, despite the importance 19
20 of creator's original intention in understanding artifacts, it is natural that it 20
21 would be only a partial determinant of naming. In communicative situations 21
22 people often receive direct information about what the object has been 22
23 named in the past. People will tend to respect this naming precedent for the 23
24 reasons described earlier: Language use is a social process, and using the name 24
25 offered is usually the best way to achieve mutual understanding and acknowl- 25
26 edge the speaker's intentions. This name offered may be that intended by the 26
27 creator, in which case creator's intention is carried forward, but it may also be 27
28 something else. Depending on the distance from the original creator and his 28
29 or her intentions, and the importance of any contrasting current goals, the 29
30 relative suitability of the original and possible alternative names may vary, and 30
31 names other than those associated with original intention may be adopted 31
32 (Malt & Sloman, 2007b; Siegel & Callanan, 2007; see also Chaigneau, 32
33 Barsalou, & Sloman, 2004). 33

34 The fluidity and flexibility of naming does not, by itself, argue against the 34
35 possibility that either original, intended function or creator's intended cate- 35
36 gory membership fully determines the boundaries of some sort of nonlinguis- 36
37 tic categories. A problem with this line of reasoning, though, is that if the 37
38 groupings picked out by names are considered distinct from nonlinguistic 38
39 groups and therefore not revealing of them, it is hard to know exactly what 39
40 would constitute the nonlinguistic categories (Sloman & Malt, 2003). When 40
41 looking at an object that is plastic and has a snap lid, how would someone 41
42 judge that its use, or what its creator intended, should group it with cardboard 42
43 things with flaps and not with other plastic containers or with some new 43
44 group of things? 44

1 An alternative approach to this issue is to suggest that although name use 1
2 in conversational contexts reflects the impact of metaphor, metonymy, 2
3 pragmatic constraints such as lack of a better name, and so on, there are 3
4 neutral contexts in which names delineate more constrained groupings and 4
5 are a useful measure of the nonlinguistic categories (Bloom, 2007). That is, 5
6 maybe the plastic snap container is not *really* a box, nor is, say, a drummer's 6
7 brush *really* a brush, even though they may be referred to in conversation as 7
8 *box* or *brush*. In on-going work we have been evaluating how people make 8
9 judgments of what something *really* is by asking them to judge whether 9
10 certain artifacts are really examples of a particular name. In one study 10
11 (Malt & Paquet, 2008), one group of participants gave typicality ratings to 11
12 objects with respect to a target name (e.g., a short, round seat with three legs 12
13 was judged typical of things called *stool*, and a taller, plastic seat with a back 13
14 was judged less typical of things called *stool*). A second group of participants 14
15 were then either told that the name (e.g., *stool*, in these cases) was given to 15
16 the object by the creator or else was just assigned to it by someone who had 16
17 found the object at a yard sale. The participants judged the extent to which 17
18 each object was really an example of the target name. These *really* judgments 18
19 strongly correlated with the objects' rated typicality, and the judgments 19
20 showed no effect of whether the creator intended it to have that name or 20
21 not. In another study, we had people read stories in which a pictured object 21
22 started out with one intended use and associated name (e.g., *decanter*) but the 22
23 story characters then adopted a different use and associated name (e.g., *vase*) 23
24 for it. Participants rated the extent to which the object was *really* an example 24
25 of the first name and of the second. Original intention had an impact on the 25
26 ratings, but the effect was modulated by how typical the pictured object was 26
27 of each of the two names and whether or not the story characters had ever 27
28 actually used the object as it was intended or had bought it planning to use it 28
29 for the second purpose. In a study in progress, we have been using recent 29
30 and more traditional objects associated with artifact names (e.g., a corded 30
31 phone and a cell phone) and have asked college-aged and older adults to 31
32 judge whether each object is *really* an example of the target name (e.g., 32
33 *phone*). We are finding that older adults rate the recent objects as less *really* 33
34 examples of the name than the younger participants do. All of these out- 34
35 comes point to the conclusion that judgments of what an artifact *really* is 35
36 don't pick out some bounded underlying category defined by original, 36
37 intended use or creator's intended category membership. Instead, they 37
38 reflect gradations in how well the object properties match properties asso- 38
39 ciated with the word in the participants' mind—multiple properties that can 39
40 shift with context and across generations as the range of objects experienced 40
41 in connection with the name shifts. 41

42 In light of these observations, one key implication for views of artifact 42
43 categorization is that it is critical to distinguish whether the issue of interest 43
44 in a given study is actually how people use names for artifacts or something 44

1 about how they understand them nonlinguistically, and to select methods 1
2 that will reflect the target topic. Another implication is that if there are 2
3 nonlinguistic “categories” that artifacts are put into, a noncircular way of 3
4 identifying those categories needs to be identified so that views of how this 4
5 categorization is accomplished can be evaluated (Sloman & Malt, 2003). 5
6 Alternatively, perhaps there are no such categories, apart from those given 6
7 by the use of a name in linguistic context (Malt & Sloman, 2007c; Sloman & 7
8 Malt). From the developmental perspective, these observations may actually 8
9 turn part of the research focus on its head. If it is of interest to ask how 9
10 children extend artifact names to objects (as opposed to how they under- 10
11 stand the objects nonlinguistically), then the most pressing issue is not to 11
12 decide whether they start with a shape-only strategy and shift to function 12
13 later or use function from the start. It is to determine whether children are 13
14 truly limited by either dimension in their early word use, and if so, how they 14
15 break free of a single dimension to mastering the full range of uses that are 15
16 linked by either one or both dimensions together. This perspective is 16
17 compatible with that in other developmental arenas. Young children can 17
18 be overly rigid as they begin to acquire a sense of adult conventions (e.g., in 18
19 applying mutual exclusivity to their word use, Markman & Wachtel, 1988; 19
20 or strict rules to moral behavior, Kohlberg, 1976; see also Casler, Terziyan, 20
21 & Greene, 2009). Becoming more flexible, not more constrained, is the 21
22 important developmental path they must follow. I will discuss developmen- 22
23 tal word learning issues further below. 23

24 25 26 27 **4.2. Implications for Word Meanings Across Languages** 26 27

28 Naming patterns for concrete objects have often been assumed to be more 28
29 cross-linguistically similar than naming patterns for abstract and socially 29
30 construed entities such as emotions or kin relations (e.g., De Groot, 30
31 1993). This assumption could be true for artifact naming if several condi- 31
32 tions were met: if the artifacts fell into fairly unambiguous groups with gaps 32
33 between them, if names were assigned to artifacts on the basis of the 33
34 groupings perceived when considering the current set together as a 34
35 whole, and if the objects and the resultant groups they fell into remained 35
36 constant over time and across cultures. I have already argued, though, that 36
37 the last two conditions don’t hold. Based on the examples that have been 37
38 discussed to this point, it should also be apparent that artifacts don’t always 38
39 fall into neat clusters separated cleanly from one another. Even if some 39
40 clustering exists, there are many objects that have partial overlap with 40
41 members of two or more clusters and no strong affiliation with anyone. If 41
42 patterns of artifact naming evolve over time and are subject to the varied 42
43 influences that I have described, then it should be expected that they will 43
44 vary across languages. 44

1 In several studies, my collaborators and I have found that this expectation 1
2 is right. We first looked into this possibility by having largely monolingual 2
3 speakers of American English, Argentinean Spanish, and Mandarin Chinese 3
4 name a set of 60 photographs of common household objects (Malt et al., 4
5 1999). We found that the naming patterns of the three groups had similarities 5
6 but also some notable differences. English speakers labeled most of the 6
7 60 objects with one of just three names—*jar*, *bottle*, and *container*—which 7
8 they used in roughly equal proportions. Spanish speakers used 15 different 8
9 names for the objects, with 28 objects being called *frasco* (or its diminutive, 9
10 *frascito*), and each of the remaining names applying to no more than six 10
11 objects. Chinese speakers used just five names for the objects, but one of 11
12 these names (*ping*) accounted for 40 of the objects. These groupings of 12
13 different sizes were not merely nested groupings reflecting finer and coarser 13
14 differentiation; they were not all formed around the same centers and they 14
15 partially cross-cut each other (Malt et al., 2003). We have now replicated 15
16 these sorts of differences in naming patterns for Belgian speakers of Dutch and 16
17 French using a different set of household containers plus a set of objects for 17
18 preparing and serving food, and for speakers of English and Russian using a set 18
19 of objects for holding and drinking liquids (Pavlenko & Malt, in press). Thus, 19
20 the assumption that words for concrete objects in general will correspond 20
21 closely across languages turns out not to be true. 21

22 The variation we have found for artifacts suggests that words for virtually 22
23 any domain may be susceptible to some cross-linguistic variability. The 23
24 extent of variability will depend on the extent of variation in the factors listed 24
25 above. For natural kinds, for instance, if there has been more consistency over 25
26 time in what exemplars are present in a culture and across cultures, and 26
27 stronger clustering of exemplars with fewer exemplars that fall between 27
28 clusters, there may be greater consistency in naming patterns (see Malt, 1995). 28
29

30 4.3. Implications for Developmental Trajectory 30 31

32 Most research on childhood word acquisition has focused on the learning that 32
33 takes place from infancy through toddlerhood. There has been a sense that 33
34 the interesting developmental stages of word learning are largely completed 34
35 during this time (e.g., Bloom, 2000), except, perhaps, in certain domains that 35
36 may pose special problems for the child (e.g., Clark, 1980). However, if 36
37 artifact naming patterns vary from language to language and cannot be 37
38 predicted just by looking for an obvious cluster into which each object falls, 38
39 then learning to name artifacts as adults do will not be a trivial task. 39
40 We (Ameel, Malt, & Storms, 2008) evaluated the developmental trajectory 40
41 by comparing the naming patterns of Dutch-speaking Belgian children (aged 41
42 5, 8, 10, 12, and 14) to adults for large set of photos of household containers 42
43 and objects for preparing and serving food (from Ameel, Storms, Malt, & 43
44 Sloman, 2005, discussed later). We found that the children took up to 44

1 age 14 to converge their naming patterns onto those of the adults, even 1
2 though the terms used by adults for most of the objects were present in their 2
3 vocabulary by the age of 8. An extended reorganization of the lexical 3
4 categories took place, with use of some names broadening (encompassing 4
5 more objects) and others narrowing (encompassing fewer objects) over time. 5
6 Regression analyses using features to predict naming choices at each age 6
7 showed that this reorganization entailed learning both to attend to the same 7
8 features the adults used and to assign adult-like weights to those features. 8
9 These findings suggest that an extended word learning period to achieve full, 9
10 adult-like use of words is not restricted to a small number of words or 10
11 domains. It includes common, concrete terms such as names for familiar 11
12 artifacts. Views of word learning will need to include an understanding of 12
13 how word knowledge continues to develop throughout childhood. 13

14 An important step toward a better understanding of the later stages of 14
15 word learning for artifacts will be to know more about what it is that the 15
16 child must master. How exactly do languages differ? Our previous work 16
17 (Malt, Sloman, & Gennari, 2003) already demonstrated that different artifact 17
18 naming patterns are not just a matter of the granularity of distinctions, but 18
19 there is more to be understood about the differences. One way that the 19
20 languages could produce the cross-cutting naming observed would be if 20
21 they used different dimensions as the primary basis for grouping artifacts by 21
22 name. For instance, one language might focus more heavily on shape, 22
23 another on size, and a third on function. Under this scenario, the child's 23
24 task is one of parameter setting, as has been proposed for some aspects of 24
25 grammar learning (e.g., in learning whether the language being acquired is 25
26 one in which pronouns are routinely dropped; Chomsky & Lasnik, 1993). 26
27 The child might have a range of possibilities ready, and by observing the 27
28 adult naming patterns, she learns which values on the parameters create the 28
29 artifact naming patterns of her language. But the discussion of English 29
30 artifact naming above already suggests that this point of view is not likely 30
31 to be right, since both function and form are implicated in English naming. 31
32 The observations do not exclude the possibility that English weights certain 32
33 dimensions more heavily than some other language does, but they do 33
34 indicate that there will be no simple, single parameter setting that the 34
35 child can select to produce mastery of English naming. What is needed, 35
36 then, is to evaluate whether there are any systematic differences between 36
37 languages that can be identified in dimensions weights or values used. If not, 37
38 one can ask whether there are any systematic differences that are specific to 38
39 certain parts of the domain. For instance, even if it is not true that English 39
40 uses function more heavily Spanish or Chinese (or vice versa) across the 40
41 board, could it be true for naming within some subset such as drinking 41
42 vessels or tools? And if there turn out not to be any generalizations that can 42
43 be drawn about dimension values or weights even within some portion of 43
44 artifacts, then it will be important to characterize the differences at a finer 44

1 grain. Informally, in a study of naming of drinking vessels in English and 1
2 Russian that will be discussed below, we (Pavlenko & Malt, in press) have 2
3 noted that, for instance, the English distinction between *cup* and *glass* is more 3
4 heavily based on material than the Russian distinction between *chashka* and 4
5 *stakan*, which is more based on size and shape. At the same time, English 5
6 separates *mug* from *cup* based on size and shape and Russian further separates 6
7 *fuzher* from *stakan* based on material and function (use for alcoholic drinks). 7
8 So each language appears to make similar featural contrasts but applied to 8
9 different sets of objects. Recently, we have been using feature-based regres- 9
10 sion models to more systematically explore the differences in naming patterns 10
11 across English, Dutch, and French for household containers and objects for 11
12 preparing and serving foods. As the Russian examples suggest, we have been 12
13 finding that the three languages use the same dimensions and values on 13
14 dimensions, but in different combinations for specific naming contrasts. 14
15 For instance, one language may discriminate by name within bowl-shaped 15
16 objects based on size whereas another does not, but the second language may 16
17 discriminate between cardboard storage containers based on size. Even these 17
18 statements do not fully take into account the family resemblance and chaining 18
19 phenomena among objects that share the same name, where some can 19
20 overlap on one dimension or set of dimensions and others will overlap on 20
21 different ones. Interesting work remains to be done to fully characterize what 21
22 it is that children must learn and how they are able to do so. 22
23

24 4.4. Implications for Bilingualism 24

25
26 Traditionally, research on bilingualism has not taken much interest in the 26
27 mastery of words for concrete objects because of the assumption that the 27
28 meanings of these words map closely across languages. If this assumption were 28
29 right, then mastery would only be a matter of learning what word in one 29
30 language corresponds to each word in the other one. However, our data 30
31 comparing naming patterns across languages imply that the task is not nearly 31
32 so easy. We tested this possibility by studying people who came to the United 32
33 States (mostly as students) with first languages other than English (Malt & 33
34 Sloman, 2003). All participants were immersed in English at the time of 34
35 testing but varied from recent arrivals to 18 years of residency. Participants 35
36 named pictures of artifacts in English, judged the typicality of each with 36
37 respect to several English names, and gave us their intuitions about how 37
38 they selected names. For comparison, native speakers did the same naming 38
39 and typicality tasks. Even those second-language learners with the shortest 39
40 length of immersion (less than 1 year) produced most of same basic vocabu- 40
41 lary words that native speakers did, but they differed from native speakers 41
42 in their application of the words to specific objects. Learners with less than 1 year 42
43 of immersion showed the most divergence, and agreement with native 43
44 speakers increased as a function of years of immersion. Similarly, those with 44

1 the fewest years of immersion did not have a good sense of what is most 1
2 typical of names such as *bottle* or *plate*, etc., but typicality judgments corre- 2
3 sponded better to native speakers' over time. Strategy reports showed a shift 3
4 from greater reliance on explicit use of specific features or translation equiva- 4
5 lents to a more intuitive selection of words. Remarkably, despite the 5
6 improvements, even the participants who had been in the U.S. the longest 6
7 (10 or more years) still deviated significantly from the native speakers in both 7
8 naming patterns and typicality judgments for some of the words. Mastering 8
9 the subtleties of the artifact naming patterns of a second language is not at all 9
10 quick and easy. To the contrary, it is a long, slow process, just as for the child 10
11 native learner. Deviations from the language community's norm may have 11
12 subtle but real consequences for communication. For instance, a native Dutch 12
13 speaker recently asked me, in an airport boarding line, if I had obtained a *chair*. 13
14 His English was otherwise excellent, but it took several rounds of back-and- 14
15 forth before I understood that he was asking if I had a confirmed seat on the 15
16 overbooked flight. 16

17 If second-language learners immersed in the second language do gradu- 17
18 ally converge on native speakers' patterns of word use, this outcome raises 18
19 the question of what becomes of the naming patterns in their native 19
20 language. Reaction-time studies have demonstrated that a bilingual's two 20
21 lexicons are not isolated from each other and interact in some fashion. 21
22 For instance, words of one language prime words in the other (e.g., 22
23 Altarriba, 1992; Kroll & Curley, 1988). Given this interaction, second- 23
24 language learners who become dominant in the second language may 24
25 show an influence of the second on the first, shifting their native naming 25
26 patterns in the direction of the second. Wolff and Ventura (in press) found 26
27 evidence for this sort of effect in the learning of causal verbs. We (Pavlenko 27
28 & Malt, in press) studied artifact naming patterns in Russian for native 28
29 speakers of Russian who came to the U.S. at various ages and became 29
30 immersed in English. We compared their patterns to those of native largely 30
31 monolingual speakers of English and Russian. Even those who came to the 31
32 U.S. as adults and rated their Russian proficiency considerably higher than 32
33 their English proficiency showed some modest signs of English influence on 33
34 their Russian naming. Those who came to the U.S. in childhood (ages 34
35 8–15) showed slightly greater influence. A substantially larger impact was 35
36 shown by those who came to the U.S. early in their lives (ages 1–6), even 36
37 though all had begun to learn Russian before exposure to English, 37
38 continued to speak Russian at home, and considered themselves moderately 38
39 proficient in Russian. These data indicate that even for those becoming 39
40 immersed in the second language in adulthood, there can be an influence of 40
41 the second language on the first. It is noteworthy, though, that the largest 41
42 impact was seen for those who had spent less time immersed in Russian and 42
43 more time immersed in English. This outcome raises new questions about 43
44 to what extent first-language shifts in the direction of a second language are 44

1 related to the initial strength of the memory traces of the first language, the 1
2 completeness of learning, or the frequency of current use, and to what 2
3 extent they depend on similar variables for the second language. 3

4 The possibility of cross-talk between the two languages of second- 4
5 language learners also raises the question of what learners do who are exposed 5
6 to two languages from the start. One possibility is that these early learners, 6
7 acquiring two native languages during the period in which language acquisi- 7
8 tion is thought to proceed most effortlessly, are able to do something late 8
9 learners do not: learn and maintain two separate sets of naming patterns, each 9
10 fully matching monolinguals in each language. Alternatively, these children 10
11 might still not be able to accomplish this feat despite their early learning and 11
12 might in some way create a compromise between the languages. We (Ameel 12
13 et al., 2005) addressed this question in Belgium, where part of the population 13
14 is Dutch-speaking and part is French-speaking but it is fairly common for 14
15 Dutch- and French-speakers to intermarry. We looked at the naming pat- 15
16 terns of Belgian adults who had been raised with one parent whose native 16
17 language was Dutch and one whose native language was French, each of 17
18 whom consistently spoke their own native tongue to the child. We compared 18
19 bilinguals' performance in each of their two languages (tested on different 19
20 days to avoid carryover effects) to that of largely monolingual Belgian speak- 20
21 ers of Dutch and French. Stimuli for the study were again sets of photos of 21
22 household containers and objects for preparing and serving food. Consistent 22
23 with earlier data, we found that the monolingual speakers had some note- 23
24 worthy differences in their naming patterns for these objects. Bilinguals, 24
25 however, showed better correspondence between the naming patterns in 25
26 their two languages than the monolinguals did for the same two languages. 26
27 In effect, bilinguals converged the patterns of the two languages toward each 27
28 other so that they were less distinct. Since they did not merge the patterns to 28
29 the extent of yielding a single, shared pattern for both, the data imply that the 29
30 differences are to some extent observed and encoded, but cross-connections 30
31 between the two lexicons may end up adjusting connections weights 31
32 between objects and words so that convergence occurs. Our on-going 32
33 research is examining the time-frame in which this takes place: Do children 33
34 start off with two distinct patterns that converge over time as repeated uses 34
35 cause adjustments of connection weights, or is the cross-language influence 35
36 something that is at work from the start, producing convergence from the 36
37 early stages of word learning? 37

38 39 4.5. Implications for the Whorfian Hypothesis 39 40

41 The Whorfian hypothesis that language shapes thought (Whorf, 1956) 41
42 suggests that where languages differ from one another in their naming 42
43 patterns, their speakers' concepts of common objects should differ. 43
44 The substantial differences we found in naming patterns for household 44

1 containers by speakers of English, Chinese, and Spanish suggest that these 1
2 three groups should have quite noticeably different concepts in the domain. 2
3 However, people learn a great deal about artifacts from direct interaction 3
4 with them, not through language alone, and so the degree of linguistic 4
5 differences may exceed that of conceptual differences (Malt, Gennari, & 5
6 Imai, in press; Wolff & Malt, in press). Malt et al. (1999) evaluated similarity 6
7 sorting by the three groups as well as naming and did find that groupings 7
8 according to similarity were shared more strongly across the three groups 8
9 than groupings according to name, suggesting that perception of the 9
10 objects' properties was at least partially independent of language. Even 10
11 those most sympathetic to Whorfian hypothesis would generally not 11
12 argue that words completely fix concepts, though, and so this finding, 12
13 while not necessarily predicted a priori by the Whorfian position, is not 13
14 entirely incompatible with it. One would want to ask whether the smaller 14
15 differences in similarity sorting that did exist among the groups could reflect 15
16 linguistic differences. Many studies testing Whorfian predictions (e.g., 16
17 Kay & Kempton, 1984; Winawer et al., 2007) have made the straightfor- 17
18 ward prediction that speakers of a language that labels a certain distinction 18
19 will see a greater difference between the two sets of referents than speakers 19
20 of a language that does not make the distinction. This sort of prediction 20
21 cannot be easily applied to the household container domain, though. For 21
22 instance, in our study, Spanish speakers used *frasco* for many of the objects 22
23 named *bottle* in English as well as all of those named *jar*, but on the other 23
24 hand, they gave distinctive names to some objects that English speakers 24
25 included within *bottle* (e.g., *mamadera* for a baby bottle; *talquera* for a talc 25
26 bottle; *roceador* for a spray bottle.) Given both facts, it is not clear whether 26
27 Spanish speakers should pay more attention to the form and/or function of 27
28 objects in the *bottle/jar* range for English speakers or less. In fact, we (Malt 28
29 et al.) found no evidence that what differences did exist in similarity sorting 29
30 corresponded to where the languages differed in their naming patterns for a 30
31 given pair of objects. The challenge for further testing a Whorfian perspec- 31
32 tive in the artifact domain is, then, to identify what specific effects of the 32
33 linguistic differences one could expect given the complexity of the naming 33
34 patterns and the nonsystematic nature of the differences among the 34
35 languages. 35
36
37

5. SUMMARY AND CONCLUSION

5.1. Summary

42 Artifact naming patterns are complex. A given artifact noun, such as *fan* or 42
43 *razor*, may be extended from one case (say, a metal key and a manual razor) to 43
44 other objects that are unlike them in form but share the same function (say, an 44

1 electronic card-like key and an electric razor). Conversely, other artifact nouns, 1
2 such as *brush* or *knife*, may be extended from one case (say, a hair brush and a 2
3 dinner knife) to other objects that are unlike them in function but have similar 3
4 forms (say, a scrub brush and a putty knife). Furthermore, some individual 4
5 nouns have extensions based on shared form and others based on shared 5
6 function, and some extensions may implicate form and function together. 6
7 These patterns can be captured descriptively by the notion of a family resem- 7
8 blance among the exemplars of a noun, with each use needing only to overlap 8
9 with some others on one or more dimensions. To account for the pattern 9
10 theoretically, it is important to recognize that naming patterns result from 10
11 diachronic, not just synchronic, processes. Naming patterns evolve over the 11
12 course of a language's history, with the pattern that emerges being influenced 12
13 by cultural factors such as what objects are present in the culture at different 13
14 times and linguistic factors such as what names become available through 14
15 language contact and borrowing. Furthermore, it is important to recognize 15
16 that naming patterns are influenced by social processes, not just individual ones. 16
17 Naming is goal-driven, so that the selection of a name for an object may be 17
18 influenced by the desire to either highlight similarities with certain other 18
19 objects or distance the object from them. And naming is cooperative, with 19
20 speakers and addressees working together in conversation to ensure that artifact 20
21 nouns are interpreted as intended despite the wide variation in what the noun 21
22 could refer to. Certain nouns may tend to stray less in their usage than others, 22
23 but even in those cases, the constraints are not absolute, suggesting that virtually 23
24 any artifact noun may be able to develop a range of uses that overlap on 24
25 different dimensions. These points about the nature of artifact naming patterns 25
26 and how to account for them cannot be readily dismissed by trying to limit the 26
27 range of exemplars that should count in the analysis of a given name, because no 27
28 principled bases for limitations are apparent. 28

29 The observations about artifact naming patterns and how they come about 29
30 have implications for understanding other aspects of cognition. One is in 30
31 reconciling conflicting data that have accumulated on the nature of artifact 31
32 "categorization." Because of the impact of historical and social influences on 32
33 naming, an account of artifact naming must differ from an account of how 33
34 people conceptualize the objects nonlinguistically. Once the distinction 34
35 between naming as linguistic process and understanding artifacts as a concep- 35
36 tual process is recognized, the observations about naming are not incompati- 36
37 ble with arguments that have been made about the nature of artifact 37
38 conceptualization; they can be different but both correct. Another area of 38
39 implication is for artifact naming across languages. Because languages have 39
40 different cultural and linguistic histories, artifact naming patterns may differ 40
41 from language to language, and this expectation has been confirmed. The 41
42 cross-linguistic variability, in turn poses special challenges for child language 42
43 learners, whose task is not just to identify obvious clusters of objects and put a 43
44 name onto each but to learn a less-obvious grouping that the language of their 44

1 environment imposes on the objects. Child learners require many years to 1
2 converge on adult naming patterns even for names of common household 2
3 objects, and much more remains to be understood about what goes on during 3
4 this extended learning period. Speakers of two languages have the added 4
5 challenge of trying to acquire and maintain two distinct sets of naming 5
6 patterns. Recent data suggest that the naming patterns of the languages can 6
7 exert mutual influences on each other, with bilingual patterns differing from 7
8 those of monolinguals in each language. This influence takes place whether 8
9 the two languages are learned in parallel from infancy or the second is 9
10 acquired later in life. Finally, the complexity of the naming patterns in any 10
11 given language add a wrinkle to understanding how language may influence 11
12 thought, because the nonsystematic nature of the differences makes it hard to 12
13 generate straightforward predictions about where linguistic influence may lie. 13
14

15 5.2. Conclusion: Not Amazing, Yet Still Amazing 15

16 I opened this chapter pointing to a recent television ad in which a company 16
17 CEO comments that it is amazing we call today's smart phone by the name 17
18 *phone*. I argued that this usage is not amazing at all in the context of a broader 18
19 consideration of how artifact nouns are used. But in closing, it may be 19
20 appropriate to turn that judgment on its head. Many artifact names, such as 20
21 the ones used in examples throughout this chapter, are common, familiar 21
22 nouns that refer to objects frequently observed and talked about in everyday 22
23 life. As with many other highly familiar phenomena, in daily life we may take 23
24 their use for granted, assuming there is little of interest to discover in the 24
25 distribution of the names or the evolution or acquisition of the patterns. 25
26 I have tried to show throughout the chapter that there is a rich and intriguing 26
27 set of observations and issues tied to the use of artifact names. From this 27
28 perspective, the CEO was right. It is amazing indeed that we still call it a phone. 28
29
30

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36

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