

The Semantics of Number in Arabic*

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1. Introduction

The Arabic category of Number presents a major challenge to the formal semanticist. In addition to a singular, a dual, and a plural, Arabic has a collective and a singulative as well as a multal and a paucal. In addition to this, Arabic has two categories which are perplexingly called "the plural of the plural" and "the dual of the plural". The purpose of the present paper is to use the semantics of individuation proposed in Ojeda (in press) to provide the complex number distinctions of Arabic with a precise interpretation. It will be seen that the proposals made in this paper agree rather well with the observations and intuitions of traditional grammarians, especially with the ones collected in the monumental *Arabic Grammar* of Mortimer Howell.

Let us begin by assuming without argument that we are given a set on which to base our semantics for Arabic Number. This set will be called *the universe of discourse*. It will also be called *E*. If the universe of discourse has any elements, they will be said to be *individuals* or, more properly, *the individuals of the universe of discourse*.

Let us turn now to kinds and their instances. Let us turn, that is, to objects like the one denoted by *the computer* in (1a) and to objects like the one denoted by *the computer* in (1b).

- (1) a. Turing invented the computer.
b. Turing repaired the computer.

It has been argued in Carlson (1978), that both kinds and their instances are individuals of the universe of discourse. This means that any relation between kinds and their instances will be a relation between elements of the universe of discourse. Consider in particular *the relation of instantiation*. This is the relation which an individual bears to a kind just in case the individual is an instance of the kind. The object denoted by *the computer* in (1b) thus bears the relation of instantiation to the object denoted by *the computer* in (1a).

The relation of instantiation allows us to define a number of notions which will prove essential to our goals. It will allow us to say, for example, that two kinds *overlap* just in case they have a common instance. More formally, let us use ' \leq ' to refer to the relation of instantiation. We define:

* I am indebted to Ali Alalou for his intuitions and for his patience in reviewing the data with me. I am also indebted to Donka Farkas, Steven Lapointe, and the anonymous SALT II readers for comments.

- (2) For all $x, y \in E$: x overlaps y if and only if there exists some $z \in E$ such that $z \leq x$ and $z \leq y$.

The relation of instantiation will allow us further definitions. Let us say that a given set of individuals constitutes a kind (or, conversely, that a kind is constituted by a given set of individuals) just if two conditions hold. One is that all the individuals in the set are instances of the kind; the other is that every instance of the kind overlaps some element or other of the given set. More formally, let w, x, y, z be arbitrary elements of E . We define:

- (3) For all $F \subseteq E$: F constitutes a kind x if and only if
- (i) $y \in F$ implies $y \leq x$.
 - (ii) $z \leq x$ implies that there exists some $w \in F$ such that z overlaps w .

We may now state the central assumption on which this paper is based. It is that the universe of discourse must satisfy the following properties when taken in conjunction with the relation of instantiation.

- (4) TRANSITIVITY: For all $x, y, z \in E$: $x \leq y$ and $y \leq z$ jointly imply that $x \leq z$.
 COMPLETENESS: For all $F \subseteq E$: If F is not empty, then there exists exactly one $x \in E$ which is a kind constituted by F .

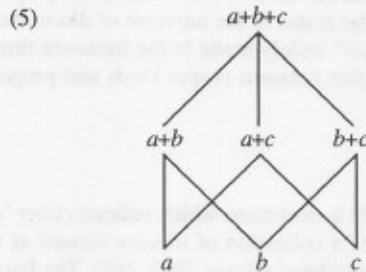
More succinctly, the assumption is that, when taken together, the universe of discourse and the relation of instantiation form a *mereology*.¹ Since a mereology is structurally indistinguishable from the positive portion of a complete boolean algebra (cf. Tarski 1956b, 333n), our central assumption is a direct descendant of proposals made in Link (1983). The main difference between our views of the universe of discourse is that we have chosen to interpret the partial order of the said algebra as the relation of instantiation.

To illustrate our central assumption, we should first introduce some useful notation. Thus, if some set F constitutes a kind, then we shall feel free to use $\Sigma(F)$ to refer to that kind. Notice that the functional notation is appropriate here since subsets constitute at most one kind each. Moreover, if a finite set $\{a, b, c, \dots, n\}$ constitutes a kind, then we may also choose to use $a+b+c+\dots+n$ to refer to that kind.

Let us now turn to (5). This is a diagram for a universe of discourse which forms a mereology when taken in conjunction with a relation of instantiation. The universe of discourse is the set $\{a, b, c, a+b, a+c, b+c, a+b+c\}$. The relation of

¹ Mereologies were first defined by Stanislaw Lesniewski in the early part of this century as an alternative to set theory. The formulation adopted in this paper is due to Tarski (1956a). Mereologies have been used as theories of the relation between parts and wholes. We shall remain neutral as to whether this should be so. As to sets, they have been used above and will continue to be used throughout this paper. See Simons (1987) for a thorough discussion of mereologies.

instantiation is such that if x and y are two distinct individuals of the universe of discourse, then x is an instance of y just in case an upward path from x to y can be followed in (5).



To make the illustration more concrete, let us suppose that a , b , and c are computers. This means that $a+b+c$ is computerkind —the kind constituted by the set of computers of the universe of discourse.² Let us moreover suppose that a and b are digital computers, that a and c are big computers and that b and c are powerful computers. It now follows that $a+b$ is the kind constituted by the set of digital computers, that $a+c$ is the kind constituted by the set of big computers, and that $b+c$ is the kind constituted by the set of powerful computers.

Interestingly, it also follows that a is the kind constituted by $\{a\}$, the set of big digital computers, that b is the kind constituted by $\{b\}$, the set of powerful digital computers, and that c is the kind constituted by $\{c\}$, the set of big powerful computers. This means that a , b , c are literally *sui generis* individuals; they are kinds onto themselves. But all seven elements of our universe of discourse are by definition individuals. We may therefore want to distinguish *sui generis* individuals by calling them *proper individuals (of the universe of discourse)*. But by completeness all seven elements of our universe of discourse are also kinds —even if some of them are kinds onto themselves. We may therefore want to invoke another distinction and set apart $a+b$, $a+c$, $b+c$, and $a+b+c$ by calling them *proper kinds (of the universe of discourse)*.³

Natural languages are sensitive to the propriety of kinds and individuals. As seen in (1), verbs like *invent* select proper kinds, while verbs like *repair* select proper individuals. As shown by (6), similar distinctions are acknowledged by adjectives like *dead* and *extinct*.

- (6) a. The dodo is extinct.

² We follow Quine (1969) in using the convenient morphological expedient of *-kind* suffixation.

³ Technically, a proper individual can be defined as a kind which lacks *proper instances* —which is to say as a kind which lacks instances other than itself. Proper kinds can be defined as those elements of the universe of discourse which are not proper individuals.

b. The dodo is dead.

For indeed, if successful, *the dodo* in (6a) refers to the proper kind constituted by all the dodos in the universe of discourse while *the dodo* in (6b) refers to the proper individual which is also constituted by all the dodos in the universe of discourse. The distinction between "kinds" and "objects" widely made in the literature thus emerges in the present context as a distinction between proper kinds and proper individuals.

2. The Collective

The collective nouns of Arabic are basic lexical items which indicate either "a substance or material in the mass", or else "a collection of objects viewed as a totality without reference to the individual members" (Erwin 1963, 166). The Iraqi dialect of Arabic contains, for example, collectives like *beeḍ* 'eggs (in general)', *xishab* 'wood', and *dijaaḥ* 'chicken (viewed as a kind of food) or chickens (as a species)'. Given the assumptions formulated in the preceding section, a proposal concerning the collective of Arabic can now be advanced. It will take the form of a constraint on the interpretation of collective nouns or, more accurately, on the interpretation of nonvacuous collective nouns.⁴ The constraint reads as follows.

- (7) Every collective noun denotes, if anything, a singleton subset of the universe of discourse.

To illustrate, let us suggest that *beeḍ* denotes $\{e\}$, where e is eggkind, the kind constituted by the set of eggs in the universe of discourse. Along similar lines, *xishab* would denote $\{w\}$, where w is woodkind, the kind constituted by the set of portions of wood in the universe of discourse. As to *dijaaḥ*, the facts are more interesting. When it means 'chickens (as a species)', it will denote $\{c\}$, where c stands for chickenkind, the kind constituted by the set of chickens in the universe of discourse. But when it means 'chicken (viewed as a kind of food)', it will denote 'chicken-food-kind', the singleton which contains the kind constituted by the set of portions of chicken food. In fact, it may denote $\{m(c)\}$, where m is the function which assigns, to each individual, the mass which makes it up (cf. the materialization function of Link 1983).

The semantics of collectives we have just proposed seems to correspond closely to intuition. As we have seen, Erwin (1963, 166) takes collectives to denote "substances" or "collections of objects viewed as a totality". Along the same lines, Talmoudi (1980, 132) regards the collective as denoting either "a collective of things or animals regarded as a unit", or else "a mass or a volume", Wright (1933, 147) describes the collective as expressing "the genus or whole", and Abdel-Massih

⁴ To ease exposition we will indulge in the terminological abuse of saying that a noun is vacuous (or that it fails to denote anything) if and only if it denotes the empty subset of the universe.

et al. (1979, 49) define the collective as a noun that designates "a class or mass of like things without counting the units that make up the mass"; it is "the mass wherein the individuality of the 'amassed' is effaced" Fleisch (1961, §65b). The collective, then, "denotes the species as a whole" (Harrell 1962, 78); it has "generic reference" (Holes 1990, 149).

But it might be thought that collectives should simply denote kinds, not the singletons of kinds. This move seems unadvisable. If noncollective nouns are to denote sets, then we cannot assign all nouns a unified semantic type. Collectives would denote type-zero denotations (elements of the universe of discourse) while noncollectives would denote type-one denotations (subsets of the universe of discourse). What is more, this type branching in the nominal system would have a wide ranging rippling effect; it would force the systems of nominal specifiers and complements to branch accordingly in order to combine meaningfully with their heads.

To gauge the strength of (7) let us recall that collectives are nouns, and that nouns denote subsets of the universe of discourse. Now, any universe of discourse with n elements will of course have 2^n subsets. Of these, only n can be collective denotations (one for each element). Thus, the universe of discourse in (5) has $2^7 = 128$ different subsets. Only seven of them, however, can serve as the denotation of a collective. They are $\{a\}$, $\{b\}$, $\{c\}$, $\{a+b\}$, $\{a+c\}$, $\{b+c\}$, $\{a+b+c\}$. The set of possible denotations for a collective noun is thus drastically reduced by the constraint in (7).

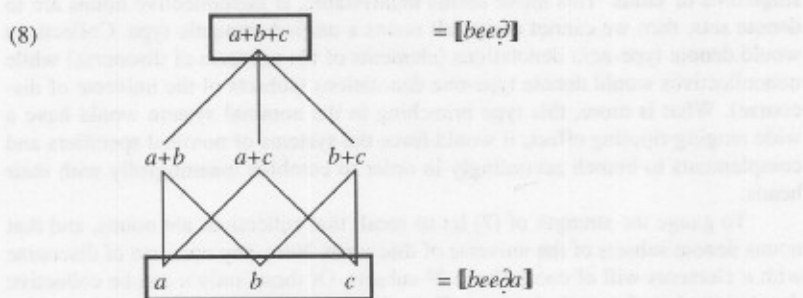
3. The Singulative

Singulative nouns are lexical items which are derived from collectives and refer either to "a specific quantity of the substance", or else to "an individual member of the collection" denoted by the collective they derive from. Thus, in the Iraqi dialect of Arabic, the collective *beeḍ* 'eggs (in general)' corresponds to the singulative *beeḍa* '(an) egg'; the collective *xishab* 'wood' corresponds to the singulative *xishba* 'piece of wood', and the collective *dijaaj* 'chicken (viewed as a kind of food) or chickens (as a species)' corresponds to the singulative *dijaaja* '(an individual) chicken' (Erwin 1963, 166).

Along the same lines, Brockelmann (1960, §66b) pointed out that the singulative ending "is sometimes attached to a noun with general meaning in order to mark a singularity (*ein Einzelnes*)". According to Harrell (1962, 78), "to indicate one member of the general category referred to by the collective, a singular is formed by adding the feminine ending *-a*". For Cowell (1964, 297), "a singulative noun designates an individual unit or instance of what its underlying noun designates collectively or in general".⁵

⁵ The term "singulative" is attributed to Zeuss (1853, 299), who used it to refer to the category of nouns which stood in opposition to the collective in Celtic. The singulative is called *ḡismu* 'l-

But what, exactly, should the singulative denote? In light of the foregoing, the answer might seem clear: a singulative should denote a set of proper individuals — indeed, the set of proper individuals which instantiate the kind denoted by its collective base. Thus, if the universe of discourse is as diagrammed in (5), and if *a*, *b*, *c* were eggs rather than computers, then the denotation of the collective *beeḍ* 'eggs' and the singulative *beeḍa* '(an) egg' would be as follows.



But a problem for this analysis arises as soon as we leave count collectives like *beeḍ* 'eggs' and move onto mass collectives like *xishab* 'wood'. For, suppose that mass kinds are characterized by the fact that they can never be instantiated by proper individuals.⁶ After all, mass nouns have been characterized as nouns which do not carry with them criteria for the individuation of their reference. If this is so, then singulatives like *xishba* 'piece of wood' would have to denote the empty set in every universe of discourse, and thus be illformed on semantic grounds. More generally, the singulatives of mass collectives would all be contradictory.

To avoid such an obviously incorrect prediction, let us suppose that we were to take a kind and split it into a set of nonoverlapping instances. We will say that this set is a *partition* of the kind in question. To be more precise, we will say that a subset of a universe of discourse counts as a partition if the subset meets two conditions. One is that no two elements of the subset overlap in the sense of (2). The other is that the subset constitutes the kind in question in the sense of (3). Let us suppose, for example, that all the wood in the universe of discourse is contained in a pile of logs. Clearly, the logs in the pile do not overlap, as they have no common parts. Moreover, these logs constitute wood in this universe. We may therefore say that the set containing these logs constitutes woodkind in the chosen universe.

As we see it, every singulative noun denotes a partition. To be more specific, a partition of the kind denoted by its corresponding collective. Thus *xishba* 'piece of wood' will denote a partition of woodkind — say the set of logs in the pile. We

waḥdati by traditional Arab grammarians and *nomen unitatis vel individualitatis* 'noun of unity or individuality' by their Western followers (cf. Greenberg 1977, 287f).

⁶ See Ojeda (in press) for arguments that mass nouns denote kinds which are deprived of proper individuals.

are then able to interpret this singulative without assuming a set of individual instances of wood (thus renouncing to an attractive analysis of mass nouns). All we need is a set of mutually exclusive and jointly exhaustive instances of wood.

It should not escape the reader that if we have an individuation for a kind, then we also have a partition for the kind, as every set of proper individuals is a set of nonoverlapping instances (if two distinct instances overlap, then they have at least one instance other than themselves, namely their overlap). It is therefore consistent with our proposals to claim that *beeḍa* '(an) egg' denotes a set of proper individuals—that is to say an *individuation*. The proposal in terms of partitions is a generalization of the proposal in terms of individuations.

But it might be thought that the proposal is *too* general. Let *k* be a kind in our universe of discourse. Suppose there is some collective which denotes $\{k\}$. If *k* is a proper kind, then it will have more than one partition. In fact, it will probably have many, as the number of partitions of a kind grows exponentially with its number of individual instances. And if *k* lacks an individuation, then it will have uncountably many partitions.⁷ It follows that kinds exhibit what might be called a *severe indeterminacy of partition*. The question thus arises as to whether all the partitions of a kind are potential denotations of a singulative. Does nominal semantics reflect the severe indeterminacy involved in the partition of a kind?

To fix intuitions, let (5) be our universe of discourse and let $a+b+c$ again be the kind of eggs contained therein. It can be shown that this kind has the five partitions listed in (9). Of these, (9e) is the only denotation for *beeḍa* '(an) egg' we have so far considered. May *beeḍa* denote (9a)-(9d) as well?

- (9) a. $\{a+b+c\}$
 b. $\{a, b+c\}$
 c. $\{b, a+c\}$
 d. $\{c, a+b\}$
 e. $\{a, b, c\}$

As we see it, the question should be answered in the affirmative. Notice that each partition of a kind represents a different way of splitting a kind into subkinds. The question then becomes whether a singulative can refer to an arbitrary split of a kind into subkinds. But as far as I can see, it can. In any event, this would not be limited to Arabic. English may use a singular like *star* or *animal* to refer to kinds of stars and kinds of animals, as when we say that the asterisk is *a star* or that the dolphin is *a remarkable animal*. No individual stars or animals are referred to here. Notice that we may even say that Napoleon and Hitler faced *the same winter* when they tried to invade Russia.

⁷ The number of partitions of a kind with *n* individual instances coincides with the number of partitions of a set of *n* elements—and hence with the *n*th term in the Bell sequence of numbers. See Gardner (1978) for a delightful piece on this versatile sequence.

That individuations are the singulative denotations which come most readily to mind is of little consequence—at least if we are concerned with semantic competence rather than with semantic performance. The relevant issue is whether partitions other than individuations are possible or not. The primacy of individuations over other partitions may then follow from other considerations—say the fact that reference to proper individuals occurs more often than reference to proper kinds.

Similar points can be made if we focus on partitions other than individuations. For, not all such partitions come equally readily to mind. Some partitions involve "natural kinds" and thus seem "more natural" than others. It might thus be thought that singulatives should only be able to denote "natural partitions". But naturalness is not something that semantics should decide. On the contrary, natural languages allow us to refer to all kinds—including the false, the unnatural, and the perverse. To make them undenotable is to demand too much of language and too little of other systems of knowledge and belief. Singulatives should be able to denote *all* partitions—at least in principle.

Let us return now to *xishba* 'piece of wood'. The move from individuations to partitions was originally motivated by this mass singulative. The same point can be made, however, with every other mass singulative. Instead of making the point thus, let us focus more closely on the gloss 'piece of wood' given by Erwin (1963, 166) for *xishba*. Notice that there are many ways of splitting wood into pieces. Indeed, given the view of mass reference adopted for this study, there will be uncountably many such ways. But all such partitions should be equally possible denotations for *xishba*. We must therefore be prepared to allow an uncountable infinity of partitions as potential denotations of a singulative!

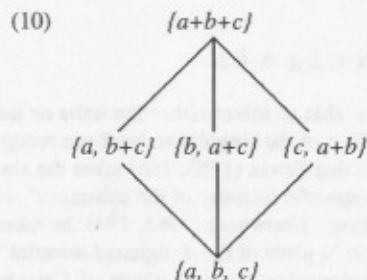
But it might be objected that woodkind may be partitioned into instances other than pieces. Indeed, it seems clear that a piece of wood must be spatially continuous (no two logs in our pile, for example, should count as *one piece*). Kinds, on the other hand, need not be spatially continuous (oak, for example, is a kind of wood which is widely scattered throughout the world). It follows that there are ways to split wood into subkinds which cannot count as pieces of wood. Surely here, the objection would go, the proposed assignment of partitions to singulatives is too general.

The point would have to be conceded—at least if we must gloss *xishba* as 'piece of wood'. But what if *xishba* could be glossed as 'instance of wood' instead? Unfortunately, the evidence for glossing it one way or the other is not easy to find, and must await further research. In any event, similar problems will be posed by all mass singulatives which are glossed in terms of highly nonarbitrary instances. Consider for example the collectives *burr* 'wheat' and *baqar* 'cattle' of Classical Arabic. Their singulatives are, respectively, *burrat* 'a grain of wheat' and *baqarat* 'a cow, bull, or ox' (cf. Howell 1900, 1057f). These singulatives denote partitions which are far from arbitrary; they denote rather salient partitions of a kind instead.

Or consider what has been traditionally called the 'singulative of specification'—the use of the singulative to refer to a dish or portion of any food, as in *orizzat* 'a dish of rice', *samakāt* 'a dish of fish', *lahmat* 'a portion of meat', and *jubnat* 'a portion of cheese' (cf. Wright 1933, 147). Here too, the partition denoted by the singulative is highly nonarbitrary. Again, our proposals for the singulative are hardly strong enough to identify, in each case, the partition denoted by the singulative.

None of these examples is necessarily problematic for our proposals. First, it must be decided whether the glosses are indeed as nonarbitrary as usually given—whether the glosses should not instead be in terms of 'instances'. But even if the glosses are accurate, the case could still be made that the proposals should be allowed to stand: the proposals would then have to be complemented by principles, drawn from other systems of knowledge and belief, which would assign a higher "selectional probability" to a partition by grains in the case of *burrat*, by actual bovines in the case of *baqarat*, and by servings in the case of *orizzat*, *samakāt*, and so on.

Let us turn now to issues of formulation. How exactly, should our proposal be casted? We begin to answer this question by observing that the partitions in (9) can be partially ordered in terms of coarseness. Thus, (9a) is the coarsest, (9e) is the finest, and (9b)-(9d) are somewhere in between (and in no particular order of coarseness with respect to each other). Diagrammatically, the situation is as shown in (10), where every upward path relates some partition to a coarser one.



But coarseness in (10) represents *genericity*. Thus, the top node of (10) represents the most generic partition of $a+b+c$, while the bottom node thereof represents its most specific partition. The partitions ordered in between are intermediate in genericity (and incomparable with each other in this respect).

Now, let us recall that $\{a+b+c\}$ may serve as the denotation of the collective *beeḍ* 'eggs'. But as indicated in (9a), $\{a+b+c\}$ is also a partition of $a+b+c$. This means that the singulative *beeḍa* '(an) egg' and the collective *beeḍ* 'eggs' are similar in that both denote partitions of a kind. *Beeḍa* and *beeḍ* differ, however, in that the former denotes a more refined partition than the latter.

As it turns out, the set of the partitions of *any* kind can be partially ordered in terms of genericity.⁸ Collective denotations will always be the coarsest partitions of a kind, while singulative denotations will always be refinements thereof. The proposals of this section thus follow from (11), where a *refinement function* is simply an operation which refines a partition.

(11) Singulative suffixes denote refinement functions.

To see this, let us take (11) in conjunction with the fact, mentioned above, that a singulative is a noun which is derived from a collective by the addition of a singulative suffix. For if we do, then the simplest way to combine the denotations of a singulative suffix and a collective stem will be for the former to operate on the latter and produce the desired refinement of a generic partition. The interpretation of the count singulative *beeḍa* 'an egg' may therefore proceed as indicated in (12). Here we assume a universe of discourse in which *a, b, c* are the only proper individuals which are eggs.

(12) $[\text{beeḍa}] = [a][[\text{beeḍ}]] = \{a, b, c\}$

In addition, the interpretation of the mass singulative *xishba* 'piece of wood', may proceed as indicated in (13), where we assume that *a, b, ..., j* are ten logs which constitute woodkind.⁹

(13) $[\text{xishba}] = [a][[\text{xishab}]] = \{a, b, c, d, e, f, g, h, i, j\}$

The singulative morpheme will thus be able to select *either* the units *or* the pieces which partition a kind. This double effect of the singulative has been recognized by Arabic grammarians. We have seen that Erwin (1963, 166) takes the singulatives of Iraqi Arabic to refer either to "a specific quantity of the substance", or else to "an individual member of the collection". Elsewhere (1963, 174), he takes them to refer either to "a single unit" or else to "a piece of the designated material". Along the same lines, Mitchell (1956, 94) describes the unit nouns of Cairene Arabic as referring to "one or a piece of a larger whole". As to Classical Arabic, Wright (1933, 147) observed that singulatives designate either "one individual out of a genus, or one part of a whole that consists of several similar parts".

The double effect of the singulative can be nicely illustrated by the ambiguous singulative *dijaaja*. For, when interpreted as a partition of a kind of bird, its

⁸ In fact, the set of partitions of any kind forms a complete lattice when taken in conjunction with the relation of refinement (cf. Grätzer 1978, 192).

⁹ Incidentally, refinement functions are defined only for partitions of a kind, and no partition of any kind can ever be empty (the definition of constitution prevents the empty set from constituting any kind in a universe of discourse which constitutes a mereology with the relation of instantiation). This means that meaningful singulatives must derive from nonvacuous collectives.

denotation proceeds along the lines of (12), but when interpreted as a partition of a kind of food, its denotation parallels (13) instead. When taken in the latter sense, it constitutes an example of the "singulative of specification" mentioned above.

Finally, it will not have escaped the reader that the flexibility of our analysis of the singulative is predicated on the availability of a multiplicity of senses for the singulative suffix. It is indeed assumed that the singulative suffix may have as many senses as there are refinement functions (a more proper notation might thus assign different subindices to the singulative morphemes in (12) and (13) above). In any case, it is in the semantics of the singulative morpheme that nominal semantics reflects the severe indeterminacy in the partition of a kind we have alluded to above.

4. The Singular

In addition to the derivational opposition between the singulative and the collective, the nominal system of Arabic recognizes an inflectional contrast between the singular, the dual, and the plural, which we will now address. We will discuss the singular in this section and leave the dual and the plural for the next.

Following the pioneering work of Link (1983), a noun is usually said to be semantically singular if and only if it denotes a set of proper individuals of the universe of discourse. Yet, in light of facts mentioned in the preceding section concerning the ability of the English singular to refer to proper kinds, (14) seems a preferable alternative. Further evidence to this effect can be drawn from quantification over kinds, from the taxonomic interpretation of mass plurals, and from the semantics of definite generics.¹⁰

- (14) A noun is semantically singular if and only if it denotes a pairwise disjoint subset of the universe of discourse.

As might be expected, a subset of the universe of discourse will be *pairwise disjoint* if and only if no two elements thereof overlap. And, since the universe of discourse is complete in the sense of (4), every pairwise disjoint subset of the universe will constitute a kind—at least if the subset is not empty.¹¹ This means that every pairwise disjoint subset of the universe will be a partition, and that the categories of the singulative and the singular do not contrast in meaning. But this is as desired; Arabic singulatives are universally regarded as singular.

Naturally, every set of proper individuals of the universe of discourse will be pairwise disjoint (proper individuals would otherwise have their overlap as

¹⁰ See Ojeda (in press) for discussion.

¹¹ It should be noticed that the empty subset of the universe of discourse is pairwise disjoint: the empty subset cannot have any elements—let alone two distinct elements which overlap. This should be as desired: it should be possible for semantically singular nouns to denote the empty subset of the universe.

instances other than themselves). But not every pairwise disjoint set will be a set of proper individuals of the universe (consider again any one of the partitions of woodkind mentioned above). It follows that (14) represents a proper generalization of the usual characterization of singular nouns.

Finally, notice that not every singular noun will be a singulative; there are many nouns in Arabic whose singular simply does not incorporate a singulative morpheme. In fact, the singulative morpheme attaches, for the most part, to collectives which belong to a particular semantic field. According to Wright (1933, 147f), singulatives are "almost entirely restricted [...] to created or natural objects. Examples of artificial or manufactured objects are very rare".¹²

5. The Dual and the Plural

A semantically singular noun of Arabic, whether singulative or not, will generally have both a dual and a plural counterpart. Consider again the singulative *beeḍa* 'egg'. We have seen that it will be singular —at least on semantic grounds. As such, it will have a dual *beeḍteen* 'two eggs' and a plural *beeḍaat* 'eggs'. To determine the semantic import of these forms we will interpret the dual and the plural inflections as follows.

- (15) a. The dual inflection denotes the function which assigns, to each pairwise disjoint $F \subseteq E$, the set $\{\Sigma(G) : G \subseteq F \text{ and } |G| = 2\}$.
 b. The plural inflection denotes a function which assigns, to each pairwise disjoint $F \subseteq E$, the set $\{\Sigma(G) : G \subseteq F\}$.

For let us suppose with tradition that the dual and the plural are derived from the singular.¹³ The interpretations of *beeḍteen* 'two eggs' and *beeḍaat* 'eggs' may now proceed as indicated in (16).

- (16) a. $\llbracket beeḍteen \rrbracket = \llbracket een \rrbracket(\llbracket beeḍa \rrbracket) = \{\Sigma(G) : G \subseteq \llbracket beeḍa \rrbracket \text{ and } |G| = 2\}$.
 b. $\llbracket beeḍaat \rrbracket = \llbracket aat \rrbracket(\llbracket beeḍa \rrbracket) = \{\Sigma(G) : G \subseteq \llbracket beeḍa \rrbracket\}$

The dual *beeḍteen* may thus denote the set of kinds constituted by the doubleton subsets of the set of individual eggs of the universe of discourse. The plural *beeḍaat*, on the other hand, may simply denote the set of kinds constituted by the arbitrary subsets of the set of individual eggs of the universe of discourse. It will not escape the reader that the denotation of a plural noun will contain the denotation

¹² Howell (1900, 1062f) reports on the belief that in this, Grammar reflects the Order of Creation —for just as natural things were created by God in the species and divided by Man in individuals, so they are named by collectives from which singulatives are then derived. And just as artificial things must be manufactured individually before they can be put into groups, so they are named by singulars from which plurals are then constructed.

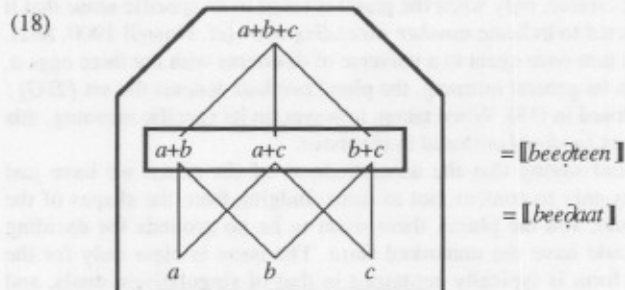
¹³ See McCarthy and Prince (1990) for phonological evidence that plurals in Arabic must derive from singulars rather than from their consonantal roots.

of its dual counterpart. In addition, it will include the denotation of its singular counterpart:

- (17) $[[bee\dot{\theta}teen] \subset [bee\dot{\theta}aat]$
 $[[bee\dot{\theta}a] \subset [bee\dot{\theta}aat]$

Since the converses of these containments do not hold in general, *the plural is the unmarked member in the Arabic contrast of number.*

To illustrate the semantics of the dual and the plural, let us once again assume a universe of discourse with exactly three eggs a, b, c . Here the dual $bee\dot{\theta}teen$ will denote the set $\{a+b, a+c, b+c\}$ enclosed in (18), while the plural $bee\dot{\theta}aat$ will denote the set $\{a, b, c, a+b, a+c, b+c, a+b+c\}$, also enclosed in (18).



Evidence that the plural is in general unmarked with respect to the singular has been provided in McCawley (1968), Mufwene (1980), Roberts (1986), Krifka (1987), and Ojeda (in press). But similar points can be made with respect to the plural and the dual. Thus, in his grammar of Syrian Arabic, Cowell (1964, 367) observed that

The dual need not be used every time two of anything are referred to. If the number happens to be two but is beside the point, or to be taken for granted, then the *plural* is used, just as in English: *ʕando banāt bass* 'He has daughters only' (applicable though he may have exactly two); *l-manṭo dayyeʔ ʕand l-ʔktāf* 'The coat is tight in the shoulders'. Cf. *ʕando bantān bass* 'He only has two daughters'; *l-manṭo dayyeʔ ʕand ʔl-kātfēn* 'The coat is tight in both shoulders'.

In reference to things that normally come in a pair, the dual is not ordinarily used in contrast to the plural, but only in contrast to the singular [...] Note that the forms *ʔəʕrēn*, 'feet, legs', *ʔidēn* 'hands, arms', *ʕēnēn* 'eyes', and *ʔadanēn* 'ears' are not duals in colloquial usage, but plurals: *ʔarbaʕ ʔəʕrēn* 'four legs'. The true duals of these words have connective *t* [...] before the suffix: *ʔəʕrtēn*, *ʔittēn*, *ʕentēn*, *ʔəḍntēn*.

Further evidence for the unmarkedness of the dual with respect to the plural is provided by Universal 34 of Greenberg (1963, 94): *No language has a dual unless it has a plural*. Also relevant is the general tendency towards the elimination of the dual documented in the languages of the world (cf. Vendryes 1937).

But having argued that the plural is unmarked with respect to the singular and the dual, we must acknowledge, here as elsewhere, the effects of a rather general process whereby the unmarked term of an opposition can come to denote the semantic difference between the marked and the unmarked terms. Cast in the original Praguean terms, this is the process whereby an expression which has a general meaning (*Gesamtbedeutung*) develops a specific meaning (*Grundbedeutung*).¹⁴ Hence the plural, which can encompass the meanings of the singular and the dual, can come to denote the set of kinds constituted by strictly more than two individuals. It is, therefore, only when the plural is taken in its specific sense that it is "a form constructed to indicate *number exceeding two*" (cf. Howell 1900, 862). To illustrate, let us turn once again to a universe of discourse with but three eggs *a*, *b*, *c*. When taken in its general meaning, the plural *beeḡaat* denotes the set $(\Sigma(G) : G \subseteq \{beeḡa\})$ enclosed in (18). When taken, however, in its specific meaning, this plural denotes the set $\{a+b+c\}$ enclosed in (8) above.

It goes without saying that the unmarkedness of the plural we have just argued for pertains only to content, not to form. Judging from the shapes of the singularive, the dual, and the plural, there seem to be no grounds for deciding which, if any, should have the unmarked form. The issue is clear only for the collective, whose form is typically contained in that of singularives, duals, and (sound) plurals.

Now, it might be objected that our proposals confuse kinds and groups. Thus, it might be thought that plurality pertains to groups, not to kinds, whereas collectivity involves kinds, not groups. As we see it, this is a distinction without a difference. Following Quine (1969), we adopt a strongly extensional view of kinds: we simply regard kinds as groups. But the critic may reply that this extensional view of kinds cannot be right —after all, different kinds may happen to have the same instances (cf. the species *Homo* and *Homo sapiens*) and, conversely, different sets of instances may correspond to the same kind (cf. the set of whales with Moby Dick and the set of whales without Moby Dick). This reply, however, asks too much of extensional objects and too little of intensional objects. By assumption, kinds are individuals. As such, they will serve as the basis for individual concepts —say functions from possible worlds to individuals. What the critic took to be *kinds* should be *kind concepts* instead —say functions from possible worlds to kinds/groups. Now different kind concepts may correspond to the same kinds/groups and, conversely, different kinds/groups may correspond to the same concept.

¹⁴ See Waugh (1976, 94-98) and the references cited there.

In any event, the view of kinds we have adopted here is not grounded on philosophical conviction but rather on linguistic fact. Notice that Arabic collectives are characterized as denoting either groups or kinds. Thus, on the one hand, collectives have been taken to denote "a class or mass of things" (cf. Abdel-Massih et al. 1979, 49). On the other hand, they have been taken to denote "the species as a whole" (Harrell 1962, 78), and as having "generic reference" (Holes 1990, 149). The two aspects of the collective denotation are brought together by Wright (1933, 147), who describes the collective as expressing "the genus or whole". It follows that to distinguish between groups and kinds would only lead us to miss a generalization concerning the semantics of the Arabic collective. Similar points can be made about the singulative. Cowell (1964, 297) points out, for example, that "a singulative designates an individual *unit* or *instance*" (emphasis supplied). And further evidence for collapsing groups and kinds comes from multal and complex plurals, as we will presently see.

6. The Paucal and the Multal

A plural in Classical Arabic is either sound (*pluralis sanus*) or broken (*pluralis fractus*). A plural is sound if it is formed by suffixation onto a usually unchanged singular stem; a plural is instead broken if it is formed primarily by the alteration of the singular stem. Interestingly, one and the same singular may sometimes have both a sound and a broken plural. Consider for instance the collective *šaḡar* 'trees'. Its singulative *šaḡarat* has two plurals. One of them is sound (*šaḡarāt*); the other is broken (*ʔašḡār*).¹⁵

Broken plurals are formed according to more than thirty patterns of daunting intricacy (cf. Wright 1933, 199-234). Of these patterns, there are four which govern the formation of the "plurals of paucity" (*pluralis paucitatis*). The rest produce "plurals of multitude". The plurals of paucity and multitude are so called because whenever used contrastively, the plural of paucity is "used only of persons and things which do not exceed *ten* in number" (Wright 1933, §307), while the plural of multitude "properly indicates what is above ten to infinity" (Howell 1900, 885). Sometimes the plurals of paucity and multitude are not used contrastively. This happens when a singular has but one plural. In such case, that plural denotes in accordance with (15b).

In Classical Arabic, the opposition between paucity and multitude was not pertinent to the sound plural: "the two sound plurals [i.e. the masculine and the feminine] are common to paucity and multitude", writes Howell (1900, 886), "and apparently they denote *unrestricted pluralization*, without regard to paucity or multitude, so that they are applicable to both." The semantics given in (15b) is thus appropriately general for the sound plural of Classical Arabic. Now precise

¹⁵ See Fischer (1972, §83).

semantics for the paucal and the multal plurals are called for. They are given in (19).

- (19) a. The paucal inflection denotes a function which assigns, to each pairwise disjoint $F \subseteq E$, the set $\{\Sigma(G): G \subseteq F \text{ and } |G| \leq 10\}$.
 b. The multal inflection denotes a function which assigns, to each pairwise disjoint $F \subseteq E$, the set $\{\Sigma(G): G \subseteq F \text{ and } |G| > 10\}$.

Incidentally, whenever the multal inflection is added onto a singular which denotes a set with less than eleven elements, the empty set will be denoted. This should be as desired.

The opposition between the multal and the paucal is likewise neutralized in the collective, which "is applied to the few and the many" (cf. Howell 1900, 1053). And even though multitude may be "imported" from the collective, "the import of multitude is not from the expression, but only from its indicated [sic], since it is indicative of genus, which imports multitude". The collective is not plural, as it "does not indicate *units*". Rather, the expression is constituted "to denote *what constitutes the special quiddity*" (cf. Howell 1900, 1054).

To illustrate the distinction between the paucal and the multal, let us return to the two plurals of *šağarat* 'tree' mentioned above. As we have indicated, one of these plurals (*šağarāt*) is sound. It thus denotes the set of trees "without regard to paucity or multitude". The other (*šašğār*), is broken. Moreover, it is a plural of paucity. It thus denotes the set of groups of ten trees or less. Clearly,

- (20) $\llbracket \text{šašğār} \rrbracket \subset \llbracket \text{šağarāt} \rrbracket$

In the modern vernaculars, few sound plurals alternate with a broken plural. Mitchell (1956, 94) points out, for example, that broken alternatives to sound plurals are "comparatively rare" in Cairene Arabic, and Cowell (1964, 369) states that a contrast between a sound and a broken plural holds only "sometimes". Yet, whenever a sound plural alternates with a broken plural, the sound plural is interpreted as a plural of paucity. As a consequence of this, the broken plural, whose general meaning (*Gesamtbedeutung*) is that of an unrestricted plural, develops the appropriate specific meaning (*Grundbedeutung*)—namely that of a plural of multitude.¹⁶

In Cairene Arabic for example, Mitchell (1962, 42) contrasts the sound plural *šağarāat* '(a few) trees', with the broken plural *šašğāar* '(different kinds of) trees', and says that the former is "a little plural", while the latter is "a big plural". Similar contrasts can be drawn from Syrian Arabic (cf. Cowell 1964, 369). Here the sound plural *samakāt* 'fish, fishes' contrasts with the broken plural *šašmāk* '(many or

¹⁶ It would be interesting to determine why the vernaculars use the sound plural for paucity and the broken plural for multitude—especially in light of the fact that broken plurals in *ša-* were characteristic of plurals of paucity in the Classical language (cf. Fischer 1972, §100).

various) fish'; the sound plural *dabbānāt* 'flies' is distinguished from the broken plural *dababīn* '(many or various) flies', and the sound plural *mōžžāt* 'waves' is set against the broken plural *šamwāž* '(many or extensive) waves'.

Along parallel lines, some singular nouns of Maltese may have two plurals. One of these plurals is "determinate"; the other "indeterminate". Determinate plurals are used with numerals from two to ten; indeterminate plurals are used "of things belonging to a certain class taken in general" (Sutcliffe 1936, §§21b, 55d), presumably when they are more than ten. Examples include *elf* 'thousand', which has both a determinate plural *elef* (cf. *sitt elef* 'six thousand'), and an indeterminate plural *elūf* (cf. *elūf ta' kotba* 'thousands of books').

It should not escape the reader that at least some of these broken plurals may refer either to groups or to kinds. The clearest documented cases come from Syrian Arabic where, as we have seen, we find broken plurals like *šasmāk* '(many or various) fish' and *dababīn* '(many or various) flies'. More generally, the plurals of multitude are said to "indicate abundance or variety" (cf. Cowell 1964, 369). Again, to distinguish between groups and kinds would only lead us to miss a generalization concerning, in this case, the semantics of the multal.

Finally, evidence that the broken plural is truly the unmarked or unrestricted plural is provided by the fact that some broken plurals can actually be used either as plurals of paucity or as plurals of multitude—even when they alternate with perfectly legitimate plurals of paucity. Consider for example the broken plural *wrāq* 'leaves'. It may be used either as a plural of abundance or as a plural of paucity even though it has in the sound plural *waražžāt* a perfectly legitimate paucal counterpart. Or consider the broken plural *wrūd* 'flowers'. It may be used either as a paucal or as a multal even though it has a paucal counterpart in the sound *wardāt*. These broken plurals are thus rightly called "all-purpose plurals" (cf. Cowell 1964, 369).¹⁷

7. The Plural of the Plural

But the complexities of Arabic number do not stop here. Some broken plurals of Classical Arabic can "assimilate" to singulars, and can then be dualized and pluralized. The effect of such secondary formations is the denotation of dualities or pluralities of groups or kinds:

Necessity sometimes leads to pluralization, as to dualization of the plural.
The broken plural is sometimes pluralized, when they mean to intensify the

¹⁷ Incidentally, according to Cowell (1964, 369), the broken plurals of multitude are the plurals of collectives (while the sound plurals of paucity are the plurals of singulatives). It is unlikely, however, that this attractive idea can be maintained in view of the fact, noted by Cowell himself, that there are no collectives for "all-purpose" broken plurals like *sagayer* 'cigarettes', *xiyam* 'tents', and *ḥayāya* 'snakes'. Moreover, given the proposals we have advanced concerning plurals and collectives, every collective would be its own plural, so the plural of a collective would be indistinguishable from the collective itself.

multiplication, and to notify *different kinds* of that sort, by assimilation of the plural expression to the singular (Howell 1900, 1071).

Consider for instance the singular *raḥṭun* 'tribe'. It has a broken plural *ṯarḥuṭun* 'association of tribes' which has, in turn, a broken plural *ṯarāḥiṭu* 'associations of tribes'. Or consider *yadun* 'hand'. It has a plural *ṯaydīn* 'assistance' whose plural is *ṯayādīn* 'assistances'. Or consider, finally, *baladun* 'village', with plural *bilādun* 'land', and secondary plural *buldānun* 'lands' (cf. Fischer 1972, §106).

As these examples make clear, the meanings of the primary plurals are not entirely predictable from the meaning of plurality (15b), and the meanings of the corresponding stems.¹⁸ It may thus be appropriate to regard the first pluralization as a derivational process which produces a new singular out of an old one (cf. Kuhn 1982, 62). It seems more likely, however, that the new singular arises diachronically rather than synchronically —i.e. as the historical reanalysis of a plural as a singular (cf. Brockelmann 1908, §239c). In either case, we have two singulars; one is *basic* and the other is *derived*. Basic singulars are *raḥṭun* 'tribe', *yadun* 'hand', and *baladun* 'village'. Derived singulars are *ṯarḥuṭun* 'association of tribes', *ṯaydīn* 'assistance', and *bilādun* 'land'. A "plural of the plural" is simply the result of pluralizing a *derived* singular in conformity with (15b).

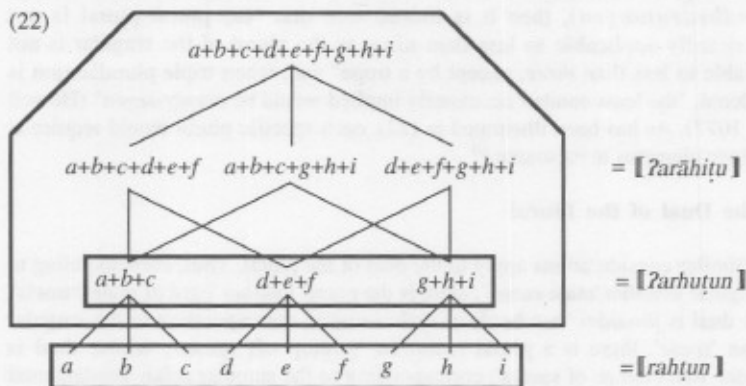
But how is the meaning of a basic singular related to the meaning of a singular derived therefrom? To answer this question, let us bear in mind that a singular must always denote a pairwise disjoint set. But every pairwise disjoint set is either the partition of some kind or else the empty set. A basic singular will therefore denote either the partition of some kind or else the empty set. A derived singular faces the same disjunction. It will denote either the partition of some kind or else the empty set. Interestingly, however, if a basic singular and its derived counterpart are not empty, they will denote different partitions *of the same kind*. What is more, we may claim that

- (21) Every derived singular denotes a coarser partition than the one denoted by its basic singular source.

Typically, a basic singular will denote the individuation of a kind —the set of proper individuals which instantiate a kind. A derived singular, on the other hand, will tend to denote a coarser partition of a kind instead. Thus *raḥṭun* 'tribe' will denote the trivial partition of tribekind into individual tribes while *ṯarḥuṭun* 'association of tribes' will denote the nontrivial partition of tribekind into tribal associations. The relation between the denotations of the two singulars will thus be as indicated in (21).

¹⁸ To describe the semantics of *ṯarḥuṭun*, Fischer gives 'einige Sippen = Sippenverband'; for *ṯaydīn*, he gives 'einige Hände, Hilfeleistung'; for *bilādun* he gives 'Ortschaften = Land'. If these were true equations, they would be unnecessary.

To visualize the relations between the derivatives of *raḥṭun* 'tribe', let us assume a universe of discourse with nine tribes *a, b, ..., i*, constituting three associations. Relative to this universe of discourse, the derivatives of *raḥṭun* 'tribe' may denote as diagrammed in (22).



Naturally, a partition will usually have many coarser counterparts. This means that the denotation of a derived plural will not always be determined given the denotation of its basic singular. (21) only *constrains* the semantics of derived singulars; it does not *determine* it. In addition, an association of tribes is more than a group of tribes; an assistance is more than a collection of hands, and a land is more than a bundle of villages. Derived plurals may therefore *specialize* in meaning and refer only to particular groups, collections or bundles. But this does not detract from the fact that the final, specialized, meaning required an intermediary coarsening of the initial meaning. It is only this intermediate stage—one which is nevertheless recorded in the morphology—that (21) seeks to describe.

In any event, the reader will have noticed that both the plural of the plural and the dual of the plural again argue for collapsing groups and kinds. As Howell (1900, 1071) put it in the quotation above, these complex formations either "intensify the multiplication" or else "notify different kinds". Plurality may therefore convey either a multiplicity of groups or a multiplicity of kinds. See also the following section, where the dual of the plural is described as denoting "the duality of the *species* or the *set*" (Fischer 1972, §108b, emphasis added).

It should be added that some plural plurals can be pluralized yet again. The singular *firqat* 'sect', for example, has a plural *firaq*, a plural plural *ʔafrāq*, and a plural plural plural *ʔafārīq* (Wright 1933, 232). Such treble formations can be straightforwardly accommodated by our proposals: *firqat* may denote the set of individual sects. This set is a partition of sectkind. It is, moreover, a refinement of the partition denoted by *firaq*, which is in turn a refinement of the partition denoted

by *ʔafāʔ*. The triple plural *ʔafārīq* denotes but the closure of the latter. Further examples of triple plurality can be found in Wright (1933, 231f) as well as in Howell (1900, 1077f) —who also records the fact that "some disapprove" of such formations...

Finally, we should notice that if we take plurals in their specific meanings (*Grundbedeutungen*), then it is indeed true that "the plural plural is not unrestrictedly applicable to less than *nine*, as the plural of the singular is not applicable to less than *three*, except by a trope" and, when triple pluralization is considered, "the least number necessarily implied would be *twenty-seven*" (Howell 1900, 1077). As has been illustrated in (22), each specific plural would require at least three elements in its source.¹⁹

8. The Dual of the Plural

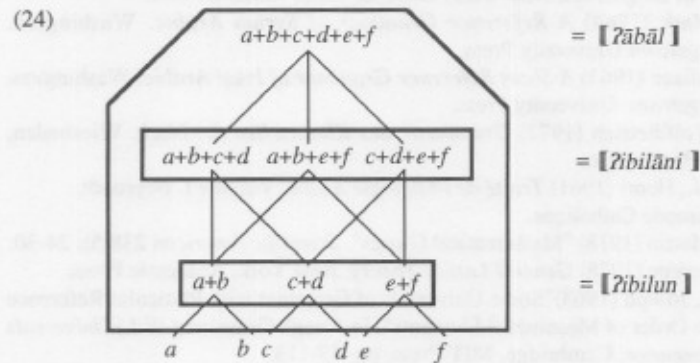
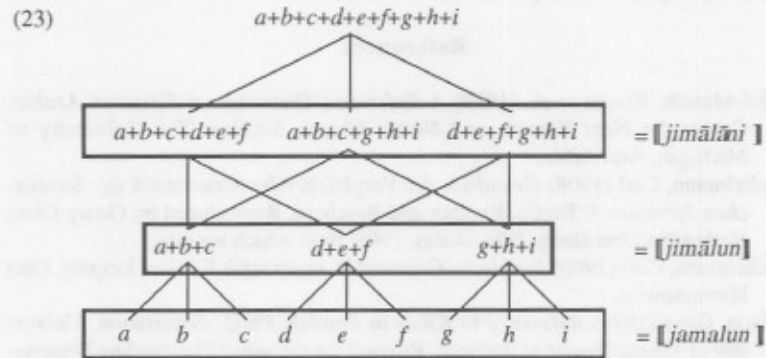
Similar considerations apply to the dual of the plural. Thus, corresponding to the singular *ʔamalun* 'male camel', there is the plural *ʔimālun* 'herd of male camels', whose dual is *ʔimālāni* 'two herds of male camels'; corresponding to the singular *rumḥun* 'spear', there is a plural *rimāḥun* '[clump of] spears', whose dual is *rimāḥāni* 'two clumps of spears'; corresponding to the singular *aṣlun* 'fundamental principle', there is the plural *uṣūlun* '[group of] fundamental principles', whose dual is *uṣūlāni* 'two [groups of] fundamental principles, namely those of theology and law' (cf. Howell 1900, 855f, 1085; Wright 1933, 191; Fischer 1972, §108b).

Here we again have derived singulars which denote partitions other than individuations: *ʔimālun* denotes a partition of the kind of male camels into herds, *rimāḥāni* denotes a partition of spearkind into clumps, and *uṣūlun* denotes a partition of fundamental principles into groups. Each one of these partitions can be dualized. It thus becomes an expression which denotes "die Zweiheit der Gattung oder Menge" (Fischer 1972, §108b); a form with the interpretation of two collections, two parties, two bodies, or two troops, of the objects in question (cf. Howell 1900, 855; Wright 1933, 190). The semantics of the derivatives of *ʔamalun* can be visualized by means of (23), where we assume a universe of discourse with nine male camels *a, b, ..., i* constituting three herds.

Closely related to the dual of the plural is the case of the dual of a singular "to the meaning of which the idea of plurality attaches" (Wright 1933, 234). Consider for instance *ibilun* 'herd of camels' and *ʔanamun* 'flock of sheep or goats' (= German *Kleinviehherde*). Their respective duals are *ʔibilāni* 'two herds of camels', and *ʔanamāni* 'two flocks of sheep or goats' (cf. Howell 1900, 855; Wright 1933, 179, 190f; Fischer 1972, §§ 85, 108b). As to their plurals, they are *ʔābāl* 'herds of camels' and *ʔaḡnām* 'flocks of sheep or goats' (cf. Brockelmanm 1960, §77b). The semantics of the derivatives of *ʔibilun* can be visualized by means of (24), where

¹⁹ Wright (1933, 232) indicates that secondary plurals can be used either when the objects denoted are at least nine in number, or when their number is indefinite —according, presumably, to whether the objects are enumerated or not (cf. Fleisch 1961, §65p).

we assume a universe of discourse with six camels a, b, \dots, f constituting three herds.



The difference between the dual of the plural and the dual of the singular "to the meaning of which the idea of plurality attaches" lies in the fact that only the former involves an intermediary plural—even if only etymologically. This is reflected in the preceding diagrams by having more than two camels make up a herd in (23), as three is the lower bound for a proper plural.

Again, the derived singulars involved in the dual of the plural cannot be determined by (21); they can only be constrained by it. The reasons for this are the same as the ones advanced in the case of the plural of the plural. First, a partition will tend to have more than one coarser counterpart. Second, the derived singular involved in the dual of the plural usually involves semantic specialization. Thus, herds, clumps, and flocks are more than simple groups/kinds of objects. Along similar lines, the principles of theology and law denoted by *uṣūlāni* are only two of

the groups of principles that the derived singular *uṣūlun* '[group of] fundamental principles' may denote. Yet, (21) is not otiose; it constrains the selection of the (semantic) singular whose specialization will dualize.

References

- Abdel-Massih, Ernest et al. (1979) *A Reference Grammar of Egyptian Arabic*. Center for Near Eastern and North African Studies. The University of Michigan, Ann Arbor.
- Brockelmann, Carl (1908) *Grundriss der Vergleichenden Grammatik der Semitischen Sprachen* I. Berlin, Reuther and Reichard. Reproduced by Georg Olms Verlagsbuchhandlung, Hildesheim, 1966, from which we cite.
- Brockelmann, Carl (1960) *Arabische Grammatik*. Fourteenth Edition. Leipzig, Otto Harrassowitz.
- Carlson, Greg (1978) *Reference to Kinds in English*. Ph.D. dissertation, University of Massachusetts at Amherst. Revised for the series Outstanding Dissertations in Linguistics. New York, Garland, 1982, which we cite.
- Cowell, Mark (1964) *A Reference Grammar of Syrian Arabic*. Washington, Georgetown University Press.
- Erwin, Wallace (1963) *A Short Reference Grammar of Iraqi Arabic*. Washington, Georgetown University Press.
- Fischer, Wolfdietrich (1972) *Grammatik des Klassischen Arabisch*. Wiesbaden, Otto Harrassowitz.
- Fleisch S. J., Henri (1961) *Traité de Philologie Arabe*, Volume I. Beyrouth, Imprimerie Catholique.
- Gardner, Martin (1978) "Mathematical Games". *Scientific American* 238(5): 24-30.
- Grätzer, George (1978) *General Lattice Theory*. New York, Academic Press.
- Greenberg, Joseph (1963) "Some Universals of Grammar with Particular Reference to the Order of Meaningful Elements". In Joseph Greenberg (Ed.) *Universals of Language*. Cambridge, MIT Press, pp. 73-113.
- Greenberg, Joseph (1977) "Numeral Classifiers and Substantival Number: Problems in the Genesis of a Linguistic Type". In Adam Makkai et al. (Eds.) *Linguistics at the Crossroads*. Padova/Lake Bluff, Liviana Editrice/Jupiter Press.
- Harrell, Richard (1962) *A Short Reference Grammar of Moroccan Arabic*. Washington, Georgetown University Press.
- Holes, Clive (1990) *Gulf Arabic*. Croom Helm Descriptive Grammars. London, Routledge.
- Howell, Mortimer (1900) *A Grammar of the Classical Arabic Language*, Part I. Published under the authority of the Northwest Provinces and the Government of Oudh. Allahabad.
- Krifka, Manfred (1987) "Nominal Reference and Temporal Constitution: Towards a Semantics of Quantity" [= Forschungsstelle für natürlich-sprachliche Systeme, Bericht 17]. Tübingen, Universität Tübingen.

- Kuhn, Wilfried (1982) "Formale Verfahren der Technik KOLLECTION". In Hansjakob Seiler and Franz Josef Stachowiak (Eds.) *Apprehension: Das sprachliche Erfassen von Gegenständen II*. Tübingen, Gunter Narr Verlag.
- Link, Godehard (1983) "The Logical Analysis of Plurals and Mass Terms: A Lattice-Theoretical Approach". In Rainer Bäuerle et al. (Eds.) *Meaning, Use, and the Interpretation of Language*. Berlin, Walter de Gruyter.
- McCarthy, John and Prince, Allan (1990) "Foot and Word in Prosodic Morphology". *Natural Language and Linguistic Theory* 8: 209-283.
- McCawley, James (1968) Review of *Current Trends in Linguistics* 3. *Language* 44: 556-593.
- Mitchell, Terence (1956) *An Introduction to Egyptian Colloquial Arabic*. London, Oxford University Press.
- Mitchell, Terence (1962) *Colloquial Arabic*. London, Hodder and Stoughton.
- Mufwene, Salikoko (1980) "Number, Countability, and Markedness in Lingala LI-MA- Noun Class". *Linguistics* 1980: 1019-1052.
- Ojeda, Almerindo (in press) *Linguistic Individuals*. CSLI Lecture Notes Series 31. Stanford, Center for the Study of Language and Information.
- Quine, Willard (1969) "Natural Kinds". In Nicholas Rescher et al. (Eds.) *Essays in Honor of Carl G. Hempel*. Dordrecht, Reidel, pp. 5-23.
- Roberts, Craig (1986) *Modal Subordination, Anaphora and Distributivity*. Ph.D. dissertation, University of Massachusetts at Amherst.
- Sutcliffe S. J., Edmund (1936) *A Grammar of the Maltese Language*. London, Oxford University Press.
- Talmoudi, Fathi (1980) *The Arabic Dialect of Sūsa (Tunisia)* [= *Orientalia Gothoburgensia* 4]. Gothenburg, Acta Universitatis Gothoburgensia.
- Tarski, Alfred (1956a) "Foundations of the Geometry of Solids". In his *Logic, Semantics, Metamathematics*. Indianapolis, Hackett, 1983, pp. 24-29.
- Tarski, Alfred (1956b) "On the Foundations of Boolean Algebra". In his *Logic, Semantics, Metamathematics*. Indianapolis, Hackett, 1983, pp. 320-341.
- Vendryes, Joseph (1937) "Sur le Nombre Duel". Reprinted in his *Choix d'Études Linguistiques et Celtiques*. Paris, Librairie C. Klincksieck, 1952, pp. 91-101, which we used.
- Waugh, Linda (1976) *Roman Jakobson's Science of Language*. Lisse, The Peter de Ridder Press.
- Wright, William (1933) *A Grammar of the Arabic Language*, Volume I. Cambridge, Cambridge University Press.
- Zeuss, Johann Kaspar (1853) *Grammatica Celtica*. Lipsiae, apud Weidmannos.

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