Headedness in Arabic Compounds within the Synthetic Genitive Construction

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Abstract
This study aims to pinpoint the position of head in Arabic compounds within the Synthetic Genitive Construction (SGC). It also examines the headedness of these compounds morphologically, syntactically, and semantically. The analysis confirms that compounding in Arabic is predominantly left-headed. The semantic, syntactic, and morphological heads always coincide in Arabic compounds within the SGC. With regard to Adj + N compounds in Arabic, I argue that a silent noun is responsible for determining the syntactic category of the whole construct, resulting in a noun rather than an adjective. The study concludes with recommendations for further research.

Keywords
Arabic compounds, Construct State, Synthetic Genitive Construction, headedness, exocentric, endocentric

Introduction
How to pinpoint the position of the head in various syntactic and morphological structures cross-linguistically has been heavily debated in the relevant literature (Arcodia, 2012; Bauer, 1990; Hudson, 1987; Polinsky, 2012; Zwicky, 1985 among others). The debate, in part, centers on the criteria used to determine the head of a structure. In addition, the types of the head, whether semantic, syntactic, or morphological, are a topic for debate among linguists (Allen, 1978; Bauer, 2009; Lieber, 2010; Scalise & Fábregas, 2010). Due to the fact that compounding is one of the most common word-formation processes cross-linguistically, determining the position of the head is of substantial importance. In this study, I explore the notion of headedness in Arabic1 compounds within the Construct State/Synthetic Genitive Construction (SGC), taking into account the existing discussion in the relevant literature.2 In particular, the study aims to provide answers to the following research questions:

Research Question 1: Where is the head located in N + N compounds and Adj + N compounds in Arabic?
Research Question 2: What are the types of head in N + N compounds and Adj + N compounds in Arabic?
Research Question 3: Does the position of the head in N + N compounds and Adj + N compounds confirm the generalization that Arabic is predominantly left-headed?

The examples of Arabic compounds within SGC (see “Applying Headedness Criteria to Arabic Compounds Within the SGC” section) used in this study were collected from different sources: (a) Arabic books discussing the SGC (e.g., Al-Jurjaani, 2004), (b) the relevant literature on SGC (e.g., Altakhaineh, 2016a, 2016b; Fassi Fehri, 2012), (c) some Arabic newspapers (e.g., Al-Ghad), and (d) my intuition as a native speaker of Arabic. More than 500 examples were collected, and these were categorized into compounds and phrases based on whether the relationship between the two elements is based on possession. In other words, all genitive constructions were excluded, since they are regarded as phrases, rather than compounds (see Altakhaineh, 2016a, pp. 6-7). For word limitation reasons, only 36 examples were discussed and analyzed in this study.

The study proceeds as follows: “Headedness” section provides an overview of the concept of headedness, discussing the main proposed criteria of headedness. “Applying Headedness Criteria to Arabic Compounds Within the SGC” section uses the criteria to identify the position and type of the head in Arabic compounds within the SGC. “The Implications of the Headedness Criteria” section discusses the implications of the headedness criteria on Arabic compounds. Finally, “Conclusion” section summarizes the main findings.

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Headedness

Overview

In an important study of the general notion of headedness, Zwicky (1985) indicates that “[t]he intuition to be captured with the notion HEAD is that in certain syntactic constructs one constituent in some sense ‘characterises’ or ‘dominates’ the whole” (p. 2). According to Zwicky (1985), determining the head relies on the idea that in any syntactic construct, one element governs or dominates the rest of the elements within that construct. However, there has been considerable debate on the definition of the head (Arcodia, 2012; Croft, 1995; Polinsky, 2012; Zwicky, 1985; among others). Some scholars argue that a unanimous definition of what exactly a head may be attainable (e.g., Hudson, 1987), while others disagree (e.g., Polinsky, 2012, p. 348). The difficulty of giving a definition of the head stems from the problems facing linguists when dealing with syntactic constructs. For instance, if the phrase the dog is interpreted to mean a dog classified as a definite object, then the determiner, that is, the, appears to be the governing element. On the contrary, if the same phrase is interpreted as a definite object, which is classified as a dog, the governing element may be the noun, that is, dog. Arcodia (2012, p. 367) notes that similar problems are also found in morphology; these are discussed in detail in the “Headedness Criteria in the Previous Literature” section.

In spite of such difficulties, there is a certain amount of consensus about the headedness of many syntactic and morphological constructs. In fact, languages are often divided into two main types in terms of the position of the head. A language is considered head-final when the head element is usually or always placed in a final position, whereas head-initial languages tend to place the head element in an initial/left position. Using this criterion, Johannessen (1996) suggests that Arabic is a head-initial language. The same point is made by Fender (2008, pp. 106, 112) for colloquial forms of Arabic as well as Modern Standard Arabic (MSA). However, neither Johannessen (1996) nor Fender (2008, pp. 106, 112) discusses the position of the head in Arabic compounds. Thus, this study aims to bridge this gap by examining the head in Arabic compounding to determine whether compounds are left- or right-headed.

With regard to English compounds, Williams (1981, p. 248) claims that the head of a complex word in English is always the right element, formulated in his famous right-hand head rule. Later, Selkirk (1982) proposes that the location of the head, in general, is a parameter, that is, it can be either the left or the right element of the word in a language. In a sample of 36 languages, excluding Arabic, the overall preference in nominal compounds is for right-headedness (Bauer, 2001, p. 697). However, in many languages such as Vietnamese and Mandarin, both left-headed and right-headed compounds can be found, which means that the parametric approach is insufficient to account for the position of the head (Booij, 2010, p. 100).

The next section aims to shed more light on the definition of headedness, both cross-linguistically and in Arabic. It provides a discussion of previous work on headedness in the relevant literature, by examining the criteria discussed by several scholars on what makes a certain element the head of a construct, and then applies these criteria to compounds in Arabic. The aim is to determine the position of the head in Arabic compounds and to identify its properties.

Headedness Criteria in the Previous Literature

Many criteria relevant to determining the head of a particular construct are discussed by Zwicky (1985). He proposes that the notion HEAD needs to capture the intuition that, in certain syntactic constructs, one element will dominate the rest (Zwicky, 1985, p. 2). He examines the following eight criteria to identify an element as a syntactic head:

1. The head is the semantic argument, which means that the element called “the head” has a meaning that acts as an argument to a functor (predicate modifier or connective). From a formal semantics viewpoint, a functor is “a sign that attaches to one or more expressions of given grammatical kind(s) to produce an expression of a given grammatical kind” (Quine, 1982, p. 129).
2. The head is the element with which other constituents must agree, that is, it is the determinant of concord.
3. The head is the element which is marked with morphosyntactic features that indicate the syntactic relations between the construct as a whole and other syntactic units in a sentence. In other words, the head bears the inflections.
4. The head is the element that selects its sisters, that is, it is the subcategorizand.
5. The head is the governor, which means that it can determine or select the morphological form of its sister on the tree. For instance, in a V + NP construct, the governor V assigns a morphological case to its sister NP.
6. The head is the element which has the same distribution as that of the whole construct, that is, it is the distributional equivalent.
7. The head is the obligatory element, in the sense that if it is removed, the whole construct must be recategorized.
8. From a dependency theory perspective, the head is the element on which other elements rely in a dependency analysis.

Publication of this list in Zwicky (1985) sparked some debate about the correctness of some of these criteria and the possibility of adding further criteria (see in particular Hudson, 1987). The consensus view that developed is...
summarized in Bauer (1990), who also points out that “... although these criteria are neatly collected in the two articles mentioned, they do not originate there: the criteria have been widely discussed in earlier literature on the subject” (pp. 2-3). Among the earlier scholars who addressed the notion of headedness are Bloomfield (1935), Marchand (1969, p. 214), Lyons (1977, p. 294), and Williams (1981, p. 248), among others. Bauer’s (1990, pp. 2-3) useful summary of past research on headedness criteria is provided below:

1. A phrase is a hyponym of its head. Hudson (1987) calls this a “kind of” relation. This principle was originally proposed by Allen (1978, p. 11), who refers to it as the “IS A” condition. This condition suggests that the whole compound denotes a subclass of the concept that the head denotes.
2. The head is the subcategorizand; it is the item that selects its sisters.
3. The head is the governor.
4. The head is the distributional equivalent of the whole phrase.
5. The head is the obligatory element in the phrase.
6. The head is the “morphosyntactic locus.”
7. The head is lexical (rather than phrasal).

The above-mentioned criteria can be used to identify the head in a phrase and have been adopted to identify the head in a compound (e.g., Arcodia, 2012). However, some of Bauer’s (1990, pp. 2-3) criteria may not be valid to identify the head in a compound (Arcodia, 2012, p. 368). In particular, Criteria 3 (the head is the governor) and 7 (the head is lexical) are not applicable to English compounds (Arcodia, 2012, p. 368). Along these lines, Arcodia (2012) notes that “it should be evident that the characterization of heads is partly different for derivation and compounding” (p. 370). However, the structure of Arabic compounds, especially those formed in compliance with the SGC, is quite different from that of English compounds. This means that some criteria which are inapplicable to English compounds may, in fact, be applicable to Arabic ones. In the next section, I therefore use all of the seven criteria compiled by Bauer (1990) to identify the head within a compound in Arabic. I group the seven criteria under three broad types, that is, semantic (Criterion 1), syntactic (Criteria 2-5), and morphological (Criteria 6-7). In the next section, I apply the above criteria to Arabic compounds within the SGC.

### Applying Headedness Criteria to Arabic Compounds Within the SGC

In this section, I look closely at Arabic compounds within the SGC on the basis of Altakhaineh’s (2016a, pp. 134-135, 172) analysis in which he suggests that a SGC compound can be defined as a complex word that consists of at least two adjacent words, and where the second element is normally non-referential. Altakhaineh (2016a) also notes that the second element of a compound within the SGC is not, in most cases, freely pluralized, as in the following examples:

1. findʒaän    ʃ-ʃaay-i
   cup         the-tea-GEN
   “the tea cup”

2. ʕaruus  l-bahr-i
   bride       the-sea-GEN
   “the mermaid”
   lit. the sea bride

3. qawiyy  l-qalb-i
   strong      the-heart-GEN
   “a brave person”
   lit. the one with the strong heart

Altakhaineh (2016b, p. 277) also identifies types of compounds other than the SGC, suggesting that N + N compounds other than the SGC, Adj + Adj compounds and reduplicated compounds can be either semantically double-headed or headless:

4. ḥilu-un murr-un
   sweet-NOM bitter-NOM
   “bitter-sweet”

5. ʕaabaah-a masaaʔ-a
   morning-ACC evening-ACC
   “all day long”
In this study, I focus on the headedness of compounds within the SGC (see Examples 1-3).

**N + N Compounds**

*The semantic criterion.* The semantic criterion of headedness is in essence simple: it states that the head of a compound is the element that determines the semantic category of the whole compound, making a compound a hyponym of its head (Lieber, 2010, p. 178). For instance, in English, the word *pole* in *flagpole* is the head, since a *flagpole* is a hyponym of *pole* (Bauer, 2009, p. 348). In Arabic N + N compounds, the left element is usually the head, since it denotes a hyponym of the whole compound, as in Examples 7 to 9:

(7) xaatam l-ʔalmaas
    ring the-diamond
    “the diamond ring”

(8) muʕallim l-fiizyaaʔ
    teacher the-physics
    “the physics teacher”

(9) mudiir l-madrasah
    principal the-school
    “the school principal”

On the basis of Allen’s (1978) principle, it is clear that

(10) xaatam lʔalmaas
    “the diamond ring” IS A xaatam “ring”

(11) muʕallim lfiizyaaʔ
    “the physics teacher” IS A muʕallim “teacher”

(12) mudiir lmadrasah
    “the school principal” IS A mudiir “principal”

Examples 10 to 12 show that the left element is a superset of the whole compound, identifying them as endocentric compounds. However, there are also exocentric compounds and those do not denote a type of the left element, as shown in Examples 13 and 14:

(13) bayt d-daradʒ
    house the-stairs
    “the stairwell”

(14) t̪aruus l-baḥr
    bride the-sea
    “the mermaid”
    lit. the sea bride

In Examples 13 and 14, *bayt ddaradʒ* “stairwell” is not a type of *bayt* “house” and *t̪aruus lbaḥr* “mermaid” is not a type of *t̪aruus* “bride.” Because Arabic compounds can be either endocentric as in Examples 7 to 9 or exocentric as in Example 13 and Example 14, it is necessary to recognize that the “IS-A” criterion cannot always be applied. But when it can, it always points to the left-hand element being the head in N + N combination within the SGC.

*The syntactic criteria.* The first syntactic criterion addresses the notion of subcategorization in relation to headedness. In this respect, Zwicky (1985) points out that
In some constructions, one slot has a special status in that the items that can fill that slot must be listed in the lexicon, while its sister constituents are not so constrained. These are instances in which one constituent is SUBCATEGORIZED with respect to its ability to occur with a particular set of sister constituents. (p. 5)

The notion “subcategorizand” has been subject to a wide debate, especially in relation to Determiner Phrases (DPs). For instance, Arcodia (2012, p. 373) notes that it is not clear whether, in the phrase these black boxes, the noun boxes or the demonstrative these is to be considered the subcategorizand (cf. Zwicky, 1985, pp. 5-6). It may be suggested that the determiner is the subcategorizand, as it is well known that determiners are lexically subcategorized; they can combine with singular count nouns (e.g., cat), plural count nouns (e.g., cats), or mass nouns (e.g., sugar). In fact, currently, several scholars (Abney, 1987; Choi, 2014; Siloni, 1997) in the generative tradition would regard the determiner (these, a demonstrative) as the head of the previous example these black boxes, which is termed DP, rather than NP.

With respect to compounding, in the endocentric English compound hairstyle, the right-hand element, that is, style is the subcategorizand, since it (i.e., the head) selects the non-head (Arcodia, 2012, p. 373). Arcodia (2012) adds that “the definition of head in endocentric compounding is closer to that of syntactic head” (p. 373); this would indicate that this definition works with neither exocentric compounds nor coordinating compounds.

In Arabic, the left element of the compound selects a set of elements to accompany it, as in Examples 15 to 17:

(15) muʕallim l-fiizyaaʔ
teacher the-physics
“the physics teacher”

(16) muʕallim l-fann
teacher the-arts
“the arts teacher”

(17) muʕallim t-taariix
teacher the-history
“the history teacher”

In Examples 15 to 17, the left element muʕallim “teacher” selects the type of words that can occur with it. In the above examples, these are subjects which the teacher teaches, that is, lfiizyaaʔ “the physics.” lfann “the arts,” and ttaariix “the history.” Therefore, the head muʕallim “teacher” is the subcategorizand, because it selects its sisters, which are in this case school subjects. Note that this selection is due to the fact that the left element teacher has the verb teach inside it. However, if we take the example sikkat lħadiid “the iron railway” in Example 13, the right element is a modifier which sometimes cannot be selected by the head, that is, when it is an adjunct. This means that the criterion does not work in this case.

(18) sikkat l-hadiid
rail the-iron
“the iron railway”

The second syntactic criterion is that the head is the governor (excluded by Arcodia, 2012, as it does not apply to English compounds). In MSA compounds (Jordanian Arabic JA has no case markings), the left element can have any case, such as nominative, accusative, or genitive on the basis of the function of the whole construct in the sentence, whereas the right element is always in the genitive case, as exemplified by Examples 19 to 21:

(19) qaabala-ni muʕallim-u l-fiizyaaʔ-i
met-me teacher-NOM the-physics-GEN
“The physics teacher met me.”

(20) qaabalt-u muʕallim-a l-fiizyaaʔ-i
met-I teacher-ACC the-physics-GEN
“I met the physics teacher.”
Example 19, the left element *maʕallimu* “the teacher” has nominative case (as it is the subject); in Example 20, it has accusative case *muʕallima* “the teacher” (being the object); and in Example 21, it has genitive case *muʕallimi* “the teacher” (as required by the preposition *maʕ*). On the contrary, the right element is always genitive in all examples. This can be accounted for by saying that the head N governs its sister, assigning it as a genitive case.

The third syntactic criterion is that the head is the element which has the same distribution as that of the whole construct. For example “…V is the distributional equivalent of V + NP, since the distribution of V + NP is roughly the same as the distribution of Vs like *write* and *vanish*…” (Zwicky, 1985, p. 12). For English, the head is the element that determines the syntactic category of a compound such as *high school*, which is syntactically a noun like *school* (Lieber, 2010, p. 178). However, it is very difficult to identify which element of the compound is responsible for determining the syntactic category of the whole N + N compounds in both English and Arabic, as both elements are nouns. Examples from Arabic are as follows:

(22) malik
king
l-ɣaabah
the-jungle
“the lion”

(23) ʒaan
find
l-qahwah
the-coffee
“the coffee cup”

The fourth syntactic criterion to identify the head is the obligatoriness of an element within the compound. This means that if such an element is omitted, the outcome will be ungrammatical depending on the nature of the sentence. For instance, Bauer (2009, p. 348) suggests that the word *pole*, in the compound *flagpole*, is obligatory, because *pole* can be used, but not *flag*, without changing the meaning. In Arabic, the left element of a compound is obligatory, as in the following examples:

(24) (a) raʔayt-u
saw-I
muʕallim
teacher
l-fiizyaʔ
the-physics
“I saw the physics teacher.”

(b) raʔayt-u
saw-I
l-muʕallim / raʔayt-u
the-teacher / saw-I
muʕallim-a-n
teacher-ACC.INDF
“*I saw the teacher.*” / “I saw a teacher.”

(c) * raʔayt-u
saw-I
l-fiizyaʔ
the-physics
*“I saw the physics.”

(25) (a) kasart-u
broke-I
ʒaan
the-coffee
l-qahwa
“*I broke the coffee cup.”

(b) kasart-u
broke-I
l-ʒaan / kasart-u
the-cup / broke-I
ʒaan-a-n
cup-ACC.INDF
“*I broke the cup.*” / “I broke a cup.”

(c) *kasart-u
broke-I
l-qahwa
the-coffee
*“I broke the coffee.”

Looking at Examples 24 and 25, the obligatory element is clearly the left element in the compounds mentioned above. Examples 24b and 25b show that the left elements can stand on their own, whereas Examples 24c and 25c demonstrate that the right elements cannot be used on their own, resulting in an ungrammatical sentence. Note, however, in the case of
non-compositional compounds, both elements are equally important to convey the meaning of the whole compound; neither of them can be deleted, as shown in Example 26:

(26) (a) qaabalt-u raaʔid  l-fadʕaaʔ met-I pioneer the-space  “I met the astronaut.”

(b) ʔqaabalt-u r-raaʔid / qaabaltu raaʔid-aan met-I the-pioneer / met.I pioneer- INDF.ACC  lit. “met the pioneer.” / “I saw a pioneer.”

(c) *qaabaltu l-fadʕaaʔ met.I the-space  lit. I met the space.

Example 26b demonstrates that the first element can be used on its own, but the meaning of the whole compound is totally lost. On the contrary, Example 26c shows that, in addition to losing the meaning of the whole compound, the second element does not normally stand on its own. Note, however, that the grammaticality versus the ungrammaticality of what remains after the first element of the compound is deleted relies heavily on the context of use. This can be illustrated with the following example:

(27) (a) ʔuħubb-u muʕallim t-taariix love-I teacher the-history  “I love the history teacher.”

(b) ʔuħub-u l-muʕallim love-I the-teacher  “I love the teacher.”

(c) ʔuħub-u t-taariix love-I the-history  “I love the history.”

In Example 26, deleting the left element results in a semantically anomalous sentence, whereas deleting the right element yields a grammatically meaningful sentence even though the meaning of the whole compound is lost. On the contrary, in Example 27, if either of the elements is omitted, the sentence would remain grammatical. This means that this criterion does not yield a clear result here. The head alone will always be acceptable in any context where the entire compound is acceptable, whereas the non-head alone is only sometimes acceptable in the same contexts. For instance, muʕallim ttaariix “the history teacher” denotes someone like the left element, that is, muʕallim “teacher” rather than the right element, that is, ttaariix “the history,” which denotes “a subject to be studied at an academic institution.” Therefore, it seems that this criterion is closely tied to the first criterion, in which the whole compound is a hyponym of the head.

Another interesting observation with regard to the obligatoriness criterion is that, in certain contexts, the left element which is supposed to be the head on the basis of Criteria 1, 2, and 3, can be omitted. This observation has been noted in particular contexts such as those related to news headlines. Examples of such cases are illustrated below:

(28) fi ħaal ʔasʕasʕarra l-ʔafyaan ʕala mawqifih min in case insisted the-senators on stand.MSG from t-taʕdiilaat . . . the-amendments . . .  “In case the senate insisted on its stand regarding the amendments . . .”  (Al-Ghad, September 16, 2015)

(29) n-nuwwaab  yuqirr ʕadadan min the-parliament members passed.MSG.PERF a number of mawaadd  qaانuun t-tanfiid
In Examples 28 to 30, the left elements *madʒlis* “council,” *madʒlis* “council,” and *niqaabah* “union” of the compounds *madʒlis lḥaqqaan* “the senate,” *madʒlis mnwwaab* “the parliament,” and *naqaabat lmμallimiin* “the teachers union” are deleted, respectively. Only the right element remains to refer to the institution which the members, that is, senators, parliament members, and teachers work in/represent. The deletion can be observed if one examines the cross-referencing marked on the element which follows the compounds. In Example 28, the singular resumptive pronoun on the word *mawqifih* “stand” refers to the singular ellipted antecedent *madʒlis* “council.” In Examples 29 and 30, the resumptive pronouns marked on the verbs, that is, *yuqirr* “has passed” and *tatawaʕʕ* “threatens” refer to the ellipted antecedents *madʒlis* “council” and *niqaabah* “union,” respectively.

The phenomenon in which the people stand for or refer to the whole institution in which they work or represent is called metonymy. In the context of newspapers, one may find instances in which one element of the compound is deleted, provided that the other element which is not deleted can compensate for the loss of the omitted element. Another interesting aspect of these metonymic compounds is that the left element is the one which is omitted, rather than the right element. This may indicate that the right element is indispensable, whereas the left element is not, at least in relation to metonymic compounds. The deletion of the left element may take place for verbal economy purposes. That is, instead of repeating the two elements throughout the news article, it would be more economical if the whole compound is mentioned at the beginning only once, then in the remaining sections, the author could delete one of the elements. Note, however, that such ellipsis is not possible with other compounds, as in the following examples:

(31) * μukkanim l-μiizyaʔ yaaʔib laakin l-kimyaʔ haadʕir
teacher the-physics absent but the-chemistry present

Intended: “the physics teacher is absent but the chemistry teacher is present.”

In English compounds too, deletion of the head sometimes takes place in some cases. Bauer, Lieber, and Plag (2013, p. 479) note that several compounds that consist of two elements lose the right element, becoming metonymic expressions, for example, *chair* for *chairperson*, *business* for *business class*, *Tasman* for *Tasman Sea*, the *Tate* for *the Tate Gallery*, and *vacuum* for *vacuum cleaner*. They also suggest that the semantic outcome of this type of ellipsis in compounds appears to be similar to the metonymy that occurs in syntactic ellipsis, for example, the *House* for the House of Representatives or that which takes place without ellipsis, for example, *Washington* for the government in Washington.

**The morphological criteria.** The first morphological criterion to determine the head in a compound is the “morphosyntactic locus.” In Arabic compounds, the morphosyntactic locus seems to be the left element. First, pluralization has always been used to identify the head (Bauer, 2009, p. 348). An example from English is *schoolboy*, which consists of *school* and *boy* and has the plural *schoolboys*, based on the head *boys*. In Arabic, the left element of the compound is the one marked for number and gender, as in Examples 32 and 33:

(32) (a) waraq-at l-ʔimtihaan
paper-FSG the-exam
“the exam paper”

(b) ʔawraaq l-ʔimtihaan
paper.FPL the-exam
“the exam papers”
Examples 32 and 33 demonstrate that plural ʕawraaq “papers” and ʕaraaʔis “brides” are the heads of the compounds ʕawraaq lʔimtihaan “the exam papers” and ʕaraaʔis l-baħr “the mermaids” on the basis of the left element. In Arabic N + N compounds, the right element normally appears in the singular form, with a few exceptions where the right element of the compound is always plural, as in Examples 28 to 30 and the compound raʔiis lwuzaraaʔ “the prime minister” (see Example 34).

In addition, the morphological gender can be used to demonstrate how the morphological locus can be determined, as in the following Arabic compounds:

(34) (a) raʔiis  l-wuzaraaʔ
    president.MSG  the-minister.MPL
    “the male prime minister”

(b) raʔiis-at  l-wuzaraaʔ
    president-FSG  the-minister.MPL
    “the female prime minister”

(35) (a) ʕaabir  s-sabiil
    passer by.MSG  the-path
    “the male passerby”

(b) ʕaabir-at s-sabiil
    passer by-FSG the-path
    “the female passerby”

The left element of the above examples is the morphosyntactic locus, as it inflects for gender. In Examples 34 and 35, the feminine form is raʔiisat lwuzaraaʔ “the female prime minister” and ʕaabirat ssabiil “the female passerby,” with no changes to the right element of the compound.

However, in some compounds, the gender and plurality tests fail to determine the head, as in Examples 36 and 37:

(36) ʕayn-u  s-samaaʔ-i
    eye-NOM  the-sky-GEN
    “the sun”

(37) yawm-u  l-hisaab-i
    day-NOM the-judgment-GEN
    “judgment day”

For semantic reasons, these compounds cannot be marked either for number or gender. In such cases, a further morphological property, that is, case, can be used to determine the position of the head:

(38) ʕayn-u  s-samaaʔ-i  dʒamiil-at-un  l-yawm
    eye.FSG-NOM  the-sky.FSG-GEN  beautiful-FSG-NOM the-day
    “The sun is beautiful today.”
The adjective *dʒamiilatun “beautiful” agrees with the word ġaynu “eye” in case, both being nominative. Thus, the case test here identifies ġaynu “eye” as the head. If the head was the noun ssamaʔi “the sky,” the adjective dʒamiilah should inflect for genitive case, but this is ungrammatical, as shown in Example 39:

(39) *ğiyn-u s-samaʔi dʒamiil-at-in l-yawm
eye.FSG.NOM the-sky.FSG-GEN beautiful-FSG-GEN the-day
“The sun is beautiful today.”

The case test criterion thus looks fairly reliable for determining the morphosyntactic locus of compounds in Arabic. Note that the case test cannot be applied in JA, as it has no case marking system. Therefore, if the plurality and gender tests are also inapplicable, the morphological locus criterion cannot be used to determine the head in JA.

The second morphological criterion, pertaining to the head being lexical rather than phrasal (Zwicky, 1985, p. 5), has been excluded by Arcodia (2012), as it does not apply to English compounding. However, this criterion does apply to Arabic compounds, as the left element is lexical, whereas the right element can be phrasal, as in Examples 40 to 42 and many of the earlier examples:

(40) mawqif l-ḥaafilah
stop the-coach/bus
“bus stop”
(41) saaʕat sˤ-sˤifr
hour the-zero
“The last hour”
(42) bayt d-daradʒ
house the-stairs
“the stairwell”

In Examples 40 to 42, the left elements, mawqif “stop,” saaʕat “hour,” and bayt “house,” are lexical items, whereas the right elements lḥaafilah “the coach,” sˤifr “the zero,” and ddaradʒ “the stairs” consist of the determiner l- “the” and the lexical items haafilah “coach/bus,” sˤifr “zero,” and daradʒ “stairs.” Simply put, the right elements are DPs, consisting of DET + N. This criterion thus seems to lend support to most of the above-mentioned criteria, by which the left element is usually shown to be the head in Arabic compounding.

To sum up, seven criteria have been applied to N + N compounds in Arabic to identify the head. Despite a few limitations of some of the criteria, it is clear that the head is the left element in Arabic N + N compounds, which supports the generalization that Arabic is a predominantly head-initial language. The next section discusses the types of head in Arabic Adj + N compounds in relation to the above-mentioned criteria.

**Adj + N Compounds**

In this section, the headedness criteria discussed above are applied to Adj + N compounds in Arabic to identify the position of the semantic, syntactic, and morphological heads. Semantically, Allen’s (1978, p. 11) condition does not apply to Adj + N compounds, because adjectives do not form super/subsets. With regard to the syntactic criteria, the first criterion concerning subcategorization, does not apply either. Adjectives cannot be shown to be heads, as they do not select their sisters, that is, nouns. Second, the left element is the governor; it can be nominative, accusative, or genitive based on the function of the whole compound in the sentence, whereas the second element is always genitive, as in Example 43:

(43) (a) qaabula-ni hasan-u l-xuluq-i
met-me good-NOM the-manner-GEN
“The one with good manners met me.”
(b) ʔaḥtarim-u hasan-a l-xuluq-i
respect-I good-ACC the-manner-GEN
“I respect the one with good manners.”
Third, concerning the distributional equivalent criterion, the left element \textit{qawiyy} “strong” is an adjective, while \textit{lbunyah} “the body” is a noun. The lexical category of the whole compound is a noun. This may suggest that the head is the right element, which determines the syntactic category of the whole compound. However, Examples 44 and 45 may suggest that the adjective \textit{qawiyy} “strong,” which is the left element, is nominalized:

\begin{verbatim}
(44) ʔaʕmal-u maʕ qawiyy l-bunyah
work-I with strong the-body
“I work with the one strong in body.”
\end{verbatim}

\begin{verbatim}
(45) tahaddayt-u qawiyy l-bunyah
challenged.I strong the-body
“I challenged the one strong in body.”
\end{verbatim}

However, I would argue that the adjective \textit{qawiyy} “strong” has not been nominalized; it remains an adjective, modifying a silent noun. This argument is supported by Günther’s (to appear) analysis of English and German data. Günther argues that the adjectives in noun phrases such as \textit{the rich}, \textit{the poor}, \textit{the impossible}, and so on have not been nominalized but are still adjectives which modify an implicit noun.

Before discussing such implicit heads, Günther (to appear) points out a difference between phrases like \textit{the innocent}, \textit{the guilty}, and \textit{the impossible}, which have a default reading as referring to people or abstract concepts (called the “Human/Abstract Construction” or “Nounless Noun Phrases”), as in Example 46, and ellipted noun phrases as in Example 47:

\begin{verbatim}
(46) Just as \textit{the innocent} should not be punished, so \textit{the guilty} should be made to pay.
\end{verbatim}

\begin{verbatim}
(47) The fact remains, however, that the challenger whose record is 19 wins and nine defeats has lost four of his last six fights and six of his last eight.
\end{verbatim}

(Günther to appear)

In Example 46, the noun phrases \textit{the innocent} and \textit{the guilty} do not have antecedents, but the ellipted noun phrase in Example 47 does. To account for the presence versus the absence of an antecedent, Günther (to appear) assumes that in the Human Construction, in Example 46, the silent noun, that is, \textit{one}, has a generic personal reading, while in cases like Example 47, the silent noun refers to a specific person or entity.

In support of these ideas, Günther (to appear) provides counter-evidence against the nominalization analysis of the adjectives in \textit{the rich}, \textit{the poor}, and so on. The first piece of evidence is that these adjectives are unable to carry plural markings as nouns normally do, that is, *\textit{the riches}, *\textit{the poors}, and so on. The second piece of evidence is that these adjectives, in both English and German, exhibit adjectival morphology, for example, comparative in Example 48 and superlative in Example 49 (Günther to appear):

\begin{verbatim}
(48) (a)  . . . the wealthier have an obligation to help the weaker and the poorer.

(b) \textit{Die Reichen werden immer reicher, die Ärmeren immer ärmer.}
“The rich are constantly getting richer, the poorer are constantly getting poorer.”
\end{verbatim}

\begin{verbatim}
(49) (a) New aid to the poorest is given as grants, not loans.

(b) \textit{das Unglaublichste zu denken und das Unmöglichste für möglich zu halten}
“to think of the most unbelievable and to consider the most impossible to be possible”
\end{verbatim}

Note that Günther does not mention the fact that the German adjectives have N case. I would suggest that N case is marked on the adjective when the head noun is implicit (see Example 43 from Arabic). This part of the analysis is not developed by Günther; thus, it requires further investigation.
The third piece of evidence against the nominalization analysis of these adjectives is that the silent noun one in nounless noun phrases in English can in fact be inserted into the construction, indicating that a nominal position must be available in the structure (Günther to appear). Interestingly, if the silent noun one appears in the sentence, it agrees with the adjective in case, number and gender in German and in number in English, that is, the innocent ones (Günther to appear).

Examining the Arabic compounds in line with Günther’s (to appear) analysis shows that the lack of an antecedent discussed by Günther (to appear) can also be observed in Examples 44 and 45, where the Adj + N compounds have a default reading referring to a person.3 Similar to Günther’s (to appear) examples from English and German, if the silent noun one/person appears in Arabic, it normally has a generic reading, in the sense that it only refers to a human being without specifying who he or she is. Note, however, that the context plays a role in identifying the intended referents. For instance, the poor in the sentence I help the poor in my village does not have a generic reading. Similarly, the following sentence from Arabic does not have a generic reading, as the context assigns a specific referent to the compound:

(50) raʔay-tu waasiʕ-at-a l-ʕaynayn maʕsadʕiiq-i khalid
saw-I wide-F-ACC the-eyes with friend-my Khalid
“I saw the girl with wide eyes with my friend Khalid.”

In addition, the silent noun agrees with the adjective in case, number, and gender, when it is pronounced, as in Example 51:

(51) (a) qaabalt-u fæxsʕ-an tˤawiil-a l-qaamat-i
met-I person.MSG-ACC tall.MSG-ACC the-figure-GEN
“I met a person with a tall figure.”

(b) qaabalt-u ʔaʕaaxsʕ-an tˤawiil-i4 l-qaamat-i
met-I person.MPL-ACC tall-MPL.ACC the-figure-GEN
“I met people with tall figures.”

(c) qaabalt-u fataat-an tˤawiil-at-a l-qaamat-i
met-I girl.FSG-ACC tall-FSG-ACC the-figure-GEN
“I met a girl with a tall figure.”

(e) qaabalt-u fatayaat-in tˤawiil-at-i5 l-qaamat-i
met-I girl.FPL-ACC tall-FSG-ACC the-figure-GEN
“I met girls with tall figures.”

Example 51 shows that the implicit noun person/girl can be realized in Adj + N compounds in Arabic, and the adjective has to agree with it. Note that adjectives in Arabic can carry the plural marker quite generally; thus, the plurality test is not applicable.

The other test of adjectivehood proposed by Günther (to appear), namely, exhibiting adjectival morphology, such as comparative and superlative, does not apply to the adjective in Adj + N compounds, as in the following examples:

(52) ʔuħibbu l-ʔaqwa qaḥb-a-n min bayni ʔaqraa-al
love.I the-strongest heart-ACC-INDF from among peers-my
“l love the bravest among my peers.”
lit. I love the one strong in heart among my peers.

In particular, when we apply the comparative and superlative test to Adj + N compounds (see Example 52, a case of superlative morphology), the structure of the compound changes. Specifically, the definite article is attached to the first element and the second element is assigned as accusative case. Therefore, I will disregard this test.

All in all, it seems that Adj + N compounds in Arabic can be analyzed as being headed by an empty noun, that is, one/person, and it is this noun that determines the syntactic category of the whole compound. Thus, the whole Adj + N compound is a noun on the basis of the syntactic category of the implicit head. In addition, it seems as though the adjective, which is the first element in Adj+ N compounds, acts on behalf of the implicit noun when it is not realized, bearing the case, number and gender markings.

The third syntactic criterion is obligatoriness of the head. The obligatory element is clearly the left element:

(53) (a) ʔuħibbu qawiyy l-bunyah
love.I strong the-body
“I love the strong and healthy person.”
Example 53b shows that the right element can be deleted, whereas Example 53c demonstrates that the left element cannot, suggesting that the left element is the obligatory one.

With regard to the morphological criteria, first, it has already been established that the left element is the morphosyntactic locus (see Example 51). Second, it is clear that the left element is lexical, whereas the second element is phrasal, because it consists of the lexical items marked with the obligatory determiners -l- “the” or -n “a/an,” as in Examples 54 to 56:

(54) ʕaziiz l-qawm
dear the-people
“the chief of people”
lit. the dear of people

(55) saʕiid l-haððˤ
happy the-luck
“the lucky person”

(56) dʕaʕif l-qalb
weak.MSG the-heart
“the cowardly male”

To sum up, the left element of the Adj + N compounds in Arabic is the implicit head one. Its absence seems to trigger case marking on the adjective, a phenomenon that is also found in German.

The Implications of the Headedness Criteria

In the previous section, it was implicitly assumed that every compound has one single head, identified by all seven properties simultaneously. However, there have been suggestions that there are different types of heads, identified by different properties. Several scholars (e.g., Allen, 1978, p. 11; Bauer, 2009, p. 348; Lieber, 2010, p. 178; Scalise & Fábregas, 2010, p. 124; Scalise, Fábregas, & Forza, 2009, pp. 49-50) have suggested that two main types of head, namely, semantic and syntactic heads, can be distinguished. Here, it is worth pointing out that the seven criteria of headedness discussed in “Headedness Criteria in the Previous Literature” section can also be used to identify types of head. For example, Haspelmath (2002, p. 88) argues that a compound has a semantic head when the whole compound denotes a hyponym of either of its elements, such as sea bird, houseboat, sailboat, school bus, handbag, and handbrake, where sea bird is a hyponym of bird and similarly for the other cases.

Concerning the syntactic head, Scalise et al. (2009) indicate that a compound has a “formal” head when (a) the head determines the class of the whole compound, or (b) when the head carries all the inflectional markers, or (c) a combination of both. For example, green is an adjective, but the syntactic category of the whole compound greenhouse is N, since the formal head is a N (pp. 49-50). In the compound school buses, the head buses is inflected for number. Finally, in the compound blue skies, the formal head skies determines the syntactic category of the whole compound and carries the plural suffix -s.

This approach is taken even further by Scalise and Fábregas (2010, p. 124), who discuss three types of head: (a) the syntactic head, which determines the syntactic category of the whole compound (e.g., sky blue is an adjective like its syntactic head blue); (b) the semantic head, which determines the semantic category (as in bookshop, which is a type of shop); and (c) the inflectional head, which carries the inflectional markers (such as the plural -s in mother(s)-in-law). When dealing with the semantic head, it is important to restate the difference between endocentric and exocentric compounds. Endocentric compounds are semantically headed, such as sailboat which is a type of boat, while exocentric compounds are not semantically headed, such as egghead which is not a hyponym of head (Booij, 2007, p. 81). In particular, the syntactic head is connected to the distributational equivalence and subcategorization criteria, the semantic head is related to hyponymy, and the inflectional head is a reflection of the morphosyntactic locus criterion. The normal expectation would be that all three types of head coincide in one and the same element of the compound. This is certainly the case in English compounds like blackbird, where bird is the semantic, syntactic, and inflectional head simultaneously; blackbird is a type of bird, it is a N like bird, and the plural is
blackbirds. However, according to Arcodia (2012, p. 366), these types of head do not necessarily coincide, such as California beauty and white collar (see Scalise & Fábregas, 2010, p. 125; Scalise et al., 2009, p. 61).

In Arabic, the semantic head in endocentric compounds is the left element, as exemplified by Example 57:

\[(57) \text{min} \text{ʃ} \text{aar} \text{l-xafab} \]
\[
\text{saw} \quad \text{the-wood} \\
\text{“the wood saw”}
\]

The compound minʃaar kwafab “the wood saw” is a hyponym of minʃaar “saw”; thus, the head of the compound is minʃaar “saw.” However, the semantic relationship is not always clear in case of non-compositional compounds, as in the following example:

\[(58) \text{bint} \text{l-ʕayn} \]
\[
\text{daughter} \quad \text{the-eye} \\
\text{“the tear”}
\]

In Example 58, bintʕayn “the tear” is not a type of bint “daughter.” As pointed out by Borer (2009), who discusses the notion of semantic head in another Semitic language, that is, Hebrew, the “IS A” condition of Allen (1978, p. 11) cannot always be applied. Although a phrase IS A modified version of its head, such a semantic connection does not always obtain in Hebrew compounds; compare Examples 59 and 60, where Example 59 is a phrase, and Example 60 is a compound:

\[(59) \]
\[
\begin{array}{ccc}
\text{beyt} & \text{mora} & \text{IS} \\
\text{house} & \text{teacher} & \text{IS} \\
\end{array}
\]
\[
\text{A bayit} \\
\text{A house}
\]

\[(60) \]
\[
\begin{array}{ccc}
\text{šomer} & \text{mexoniyot} & \text{IS} \\
\text{guard} & \text{cars} & \text{IS} \\
\end{array}
\]
\[
\text{A šomer} \\
\text{A guard}
\]

Borer (2009) uses examples such as Example 60 to argue that some compounds in Hebrew are semantically headless. In particular, the whole compound is not a hyponym of either of its elements. Thus, looking at Example 58 from Arabic and Example 60 from Hebrew, it seems that some compounds lack a semantic head. However, in the approach sketched above, they can still have a syntactic and/or morphological head.

With respect to the syntactic head of a compound, it is the element that determines the syntactic category of the whole compound (Scalise & Fábregas, 2010, p. 124). In Arabic, the left element is the syntactic head, as in Example 61:

\[(61) \text{ʔuḥubb-u qawiyy-at l-qalb} \]
\[
\text{love-I strong-FSG the-heart} \\
\text{“I love the brave female.”} \\
\text{lit. I love the one with the strong heart.}
\]

Example 61 shows that the implicit left element one is the syntactic head of the whole compound. The syntactic category of the compound qawiyyat lqalb “the brave female one” is a noun like the implicit head one, not like the adjective qawiyyat “strong.”

Finally, Scalise and Fábregas (2010, 124) state that the morphological head carries the inflectional features of a word, such as gender, number, and case. In Arabic, the element which carries the inflectional features, namely, number and gender is the left element. This is illustrated with the following examples:

\[(62) \]
\[
\begin{array}{ccc}
\text{muʕallim} & \text{l-kiimyaʔ} & \text{IS} \\
\text{teacher.MSG} & \text{the-chemistry} & \text{IS} \\
\end{array}
\]
\[
\text{the-chemistry teacher}
\]
Conclusion

Taking all the previous points into consideration, several generalizations can be made with regard to headedness in Arabic compounds within the SGC:

1. All N + N compounds are left-headed in accordance with the semantic, syntactic, and morphological criteria, supporting the generalization that Arabic is a predominantly head-initial language.
2. The semantic, syntactic, and morphological heads always coincide in Arabic compounds.
3. The most reliable test to determine the morphological head in Arabic is the case test, which provides a better test than number and gender.
4. In Adj + N compounds, a silent noun, that is, one/person is responsible for determining the syntactic category of the whole construct. This silent noun is the head, which supports the generalization that Arabic is a predominantly head-initial language.

This study has shown that the criteria used to identify the head in syntactic constructs, for example, phrases proposed by Zwicky (1985) and later developed by Bauer (1990), have proven their validity in identifying heads in English compounds (see Arcodia, 2012) and in Arabic compounds. Based on these conclusions, it is recommended that further studies which investigate the position of the head in other types of compounds in Arabic, such as V + V compounds, are needed to determine, first, whether all types of compounds are headed and, second, whether they are all left-headed or not.

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Notes

1. Arabic refers to Modern Standard Arabic (MSA).
2. The Construct State (referred to in Arabic as Idʕaafah) is defined as a construct that normally consists of two nouns or an adjective and a noun where the first element can be nominative, accusative or genitive based on the function of the whole construct in the sentence, whereas the second element is always genitive. Another important characteristic of the Construct State is that the first element is always indefinite, whereas the second can be definite or indefinite (see Fassi Fehri, 2012, p. 156). In this study, however, I opted for the term Synthetic Genitive Construction, which contrasts with “analytic genitives,” that is, with the possessive markers, for example, li “for/ of” in MSA. In fact, the “Construct State” refers to the morphological form of the possessum in a construct, for example, the lack of nunation and in some Arabic dialects, for example, Jordanian Arabic, the feminine suffix surfacing with a final /t/, and so on (see Altakhainehe 2016a, pp. 6-7).
3. Although the analysis provided by Günther (to appear) is proposed to study phrases such as the rich, the poor, and so on, I adopted her analysis to account for the missing head in bahuvrhi compounds in MSA, since both structures share the property of having an implicit head. A similar line of reasoning has been followed by other researchers (e.g., Arcodia, 2012; Bauer, 1990). In particular, some headedness criteria for phrasehood have also been applied to identify the head in a compound.
4. Originally, the adjective is tˤawiilin “tall (plural),” but the –n is deleted from the left element when it is followed by a noun.
Note that -i is the case marking of both the accusative and the genitive in masculine sound plural in Arabic.

5. The accusative case in the feminine sound plural in Arabic is realized in the same way as the genitive with -i.

6. Here, one may argue that bayt “house” is a building/place; thus, it does have a semantic head. This case may require a grammaticality judgment task by Hebrew speakers and is thus not pursued here any further.

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