

**The logic/language divide
in classical Arabic semantics,
Sīrāfī (10th c) to Rāzī (12th c)**

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At least until 12th century, logicians and linguists formed different communities, though parts of the same society. Jāhīz, early 9th century, recommends a curriculum including both logic and language.

Rescher is sometimes quoted:

‘The closeness of the connections between logic and grammatical-rhetorical studies is evidenced by the impact of the writings of the grammarian Abu Ya‘qūb al-Sakkākī (d. 1299).

Beginning with al-Qazwīnī al-Kātibī (d. 1276), virtually every Arabic logical writer of any importance wrote commentaries or glosses upon his works.’

But Rescher has confused al-Qazwīnī al-Kātibī (d. 1276), a logician and astronomer not connected to linguistics, with al-Khaṭīb al-Qazwīnī (d. 1338), a linguist who wrote commentaries on the linguistic writings of al-Sakkākī but ignored his logic.

The first person recognised as a major contributor to both logic and linguistic semantics is Fakhr-al-Dīn al-Rāzī, 1149–1209.

The next may have been Taftāzānī (late 14th c.) at the Moghul court, out of our period.

Brief sketch of each of the strands, linguistics first

632 Death of Muḥammad.

Next hundred years, Qur’an text established and studied for its linguistic properties.

Al-Khalīl (718–786) invents dictionaries and search algorithms (among other things).

Sībawayhi (c. 760–796), student of Al-Khalīl, writes *Kitāb*, a comprehensive description of Arabic involving grammar, semantics, pronunciation and stylistics.

Al-Sīrāfī (892–979) writes first mega-commentary on Sībawayhi’s *Kitāb*.

Arabic syntacticians built a very sophisticated theory based on theoretical principles, e.g. Ibn al-Sarrāj al-Baghdādī (d. 928) who produced a non-Aristotelian formal theory. (The principles are much less ‘known’ than what follows from them, and are clearly open to revision. See below.)

Strong reaction of Abd al-Qāhīr al-Jurjānī, c. 1004–1078, who begins study of the expressive powers of language, for example through metaphor and through ordering of elements of sentences.

Jurjānī’s ideas are taken up by Fakhr-al-Dīn al-Rāzī (1149–1209) and al-Sakkākī (1160–1229) to form the ‘science of meanings’.

Ibn Sīnā’s logic bewilders the next generations of Arabic-speaking logicians, until in late 12th century Rāzī proposes a fundamental reorganisation which releases a large amount of research.

Al-Sakkākī includes a substantial summary of Rāzī’s logic with the ‘science of meanings’ in his *Miftah al-‘ulum*. Later commentators on Sakkākī ignore the logic.

Logic second

Imported from Greece via Antioch in Syria. Highly professional translation industry from Aristotle’s Greek to Arabic in the 8th and early 9th century.

Al-Fārābī (c. 872–c. 950) gives first high-calibre Arabic exposition of Aristotle’s logic and metaphysics. Many references to language, mostly lexicographic or classificatory, but e.g. the first clear statement of (Aristotelian) compositionality.

Ibn Sīnā (c. 980–1037) is in logic a dissident and highly original Aristotelian with a strong interest in semantics and in algorithmic aspects of logic.

Issues between logicians and linguists

are not necessarily issues between logic and language. E.g.

932 Al-Sīrāfī denounces Aristotelian logicians for their subservience to Greek sources and their lack of interest in linguistic usage—two criticisms repeated later by Ibn Sīnā.

Yaḥyā bin ‘Adī (893–974) attempts a demarcation to keep linguists out of logic.

Sample semantic issues between logic and linguistics

1. Do meanings compose like words?

The first clear statements of compositionality are by al-Fārābī and Abelard (Paris, 12th c.).

Al-Fārābī: ‘For everything that the science of grammar gives us about rules for expressions, the science of logic gives us an analogous thing about concepts’
(*Catalogue of sciences* 2005 pp. 53–5).

Unlikely that al-Fārābī is the source,
since his interest in linguistic composition is rudimentary.
But we have no evidence of any common antecedent.

Giolfo and Hodges: Al-Fārābī may be relying on a common understanding between Arabic logicians and Arabic linguists, going back at least to Sībawayhi, that the ‘meaning’ of an expression in a statement is the speaker’s intention in including that expression.

The dictionary meaning is the ‘usual’ meaning in statements.

Meanings in this sense are in 1–1 correlation with the ingredients of the statement, whatever you take these to be.

Logicians’ interest in compounds was bounded by the range of logical rules considered, never going down into deeper levels of compounds. (‘Top-level processing’.)

Al-Sakkākī’s example, a linguist’s example thrown up by reading a logician,
is a propositional tautology which today we would write as

$$((p \leftrightarrow q) \rightarrow ((p \rightarrow q) \rightarrow (q \rightarrow p))) \rightarrow ((\neg p \rightarrow \neg q) \rightarrow (\neg q \rightarrow \neg p))$$

in
kana(1) al-naṭīqu laziman musawwyyan lil-insani
ṣahḥa(2)
in
kana(3)
matta
kana(4)
kullama
kana(5) hada nsanan
fa-huwa(6) naṭīqun
kana(7)
kullama
kana(8) naṭīqan
fa-huwa(9) insanun
fa-yakunu(10)
matta
kana(11)
kullama
lam yakun(12) 'an
yakuna(13) nsanan
lam yakun(14) 'an
yakuna(15) naṭīqan
kana(16)
kullama
lam yakun(17) 'an
yakuna(18) naṭīqan
lam yakun(19) 'an
yakuna(20) nsanan

2. How can a statement about an indefinite topic be unambiguous?

Al-Sirāfī i.305:

People dislike having a [semantically] indefinite topic (مبتدأ) because of the obscurity/ambiguity (لبس).

However, it does occur. Note *Surat al-hujarat* 49.12:

إِنَّ بَعْضَ الظَّنِّ إِثْمٌ. ‘Suspicion is in some cases a sin.’

Al-Sirāfī is signalling (like many other Arabic linguists) that in usage a topic is supposed to specify—unambiguously for both speaker and listener—what known entity the statement is about. A semantically indefinite topic can't do that.

Nevertheless a sentence with semantically indefinite topic need not be obscure or ambiguous at all.

In logic, the 9th century Baghdad translators of Aristotle needed an Arabic form to represent Aristotle's subject-predicate sentences, e.g.

Some *B* is an *A*.

They chose topic-comment form, e.g.

بعض ال ب ا

In initial position the *بعض* is syntactically definite, being in *'idafa* with *الباء*. But semantically it's at the extreme end of indefiniteness. So we have a conflict.

Writing informally, Ibn Sīnā tends to recast the sentences:

المتحرّكات بعضها ناس (*Qiyas* 209.2)

العلم موجود في كلّ كيفة (*Qiyas* 483.5)

من الحيوان ما هو سابح (*Burhan* 140.14)

(He explicitly says that the second sentence is to be read as existentially quantified.)

In all these cases the subject term minus the quantifier becomes the topic, both syntactically and semantically definite. The existential quantifier moves into the comment.

3. How can an equality be informative?

Today we tend to think of this as a logicians' issue, thanks to Gottlob Frege's article of 1892 which asked how it can be informative to be told that

The morning star is the evening star.

But in fact it was the linguist Al-Sirāfi who asked Frege's question.

Al-Sirāfi's answer:

The topic and the comment can be known separately (منفرد) or in combination (مركب). You can know Zayd through having heard about him, and you can know my brother through having met him. But it is still new information to be told that Zayd and my brother are the same person.

Presumably مركب here means that we have two criteria for identifying the same individual, *and we know* that they both identify the same individual.

The interlocutor may have no better than منفرد knowledge. The statement conveys information by raising the interlocutor's knowledge to مركب.

Al-Sirāfi i.307:

إن قال قائل: إذا كان الاسم والخبر جميعا معروفين، فما الفائدة؟
 “Suppose someone were to say: When both the *ism* and the *khabar* are known, how can the sentence be informative?”

This is about topic-comment (اسم and خبر) sentences.

Al-Sirāfi intends '(semantically) known' rather than '(syntactically) definite', since otherwise the question doesn't make sense.

So the question asked is: If the topic and the comment are both individuals known to the interlocutor, how could the interlocutor get further information by being told that they are the same individual?

4. The nature of a linguistic theory

Ibn Jinnī (932–1002) attacks al-Sarrāj's theoretical hierarchy of linguistic causes. Al-Sarrāj asked:

—Why is 'Zayd' in the nominative in 'Zayd is standing up'?

Because 'Zayd' is the agent.

—Why does the agent go into the nominative?

Because etc.; the answer here is the *cause of the cause*.

Ibn Jinnī: there are no 'higher' causes, because when the individual linguistic phenomena have been explained, that's all there is to explain. Once we start looking for explanations of explanations, there is no natural stopping-place.

Ibn Sīnā would certainly answer that there are higher causes; they have greater explanatory power and more certainty. The process halts when we reach principles that are totally certain.

Ibn Jinnī and al-Sarrāj would probably both respond: No, you completely misunderstand what is going on. The higher principles are in no way more certain than the individual phenomena, they just play the role of bringing the phenomena into an integrated system.

What a pity this conversation never took place!

Some Western literature:

A. Elamrani-Jamal, *Logique Aristotélicienne et Grammaire Arabe*, Vrin, Paris 1983.

Manuela E. B. Giolfo and Wilfrid Hodges, ‘Syntax and meaning in Sīrāfi and Ibn Sīnā’, *Romano-Arabica* 13 (2013) 81–97.

Wilfrid Hodges, ‘Formalizing the relationship between meaning and syntax’, in *The Oxford Handbook of Compositionality*, ed. M. Werning, W. Hinzen and E. Machery, Oxford University Press, Oxford 2012, pp. 245–261.

Kees Versteegh, ‘Logique et grammaire au dixième siècle’, *Histoire, Epistémologie, Langage* 2 (1980) 39–52.