Declarative and procedural knowledge of auxiliaries in a second language: an Eye-tracking study on auxiliary selection in L2 Italian.

I report an eye-tracking and acceptability judgments study on auxiliary selection in L2 Italian. The general issue is the grammar/parser (knowledge/processing) divide in second language acquisition. Specific research questions are: (i) if learners have a grammatical or a statistical rule for auxiliary selection; (ii) if this rule drives online processing; (ii) if the eye-tracking technique (and reading measures) can tell us something about such a rule.

Subjects (n.25 + 7 controls) are asked to judge (Yes|No) the acceptability of sentences (n. 32 + 32 fillers) displaying right or wrong auxiliaries while eyes movements are recorded. Subjects are all initial learners of Italian but they differ as to L1s, instructional background and recency of instruction (see table 1). In order to see whether a grammatical rule is at work, the design contrasts *type* (n=8) and *mismatching* (n=8) verbs. *Type* verbs are those for which the syntactic (unaccusative vs. unergative) and semantic (like inherent telicity and agentivity) distinctions are supposed to be relevant to determine either auxiliary. Instead, *mismatching* verbs either take both auxiliaries or take an unexpected auxiliary given the semantic template. In order to see whether a statistical rule is at work, I regress different reading measures (e.g. first pass, total reading times) as random variables on both token frequency of constructions and "backward transition probability" (BTP, the probability of having word *n* -1 given *n*) scores as fixed factors in a mixed effect logistic regression. My data suggest that either subjects do not have an automatized (procedural/implicit) rule or – if they have one – it is still opaque to eye-tracking measures. In fact, on one side, high frequency of (auxiliary + past participles) constructions, high BTP scores, alphabetical L1s and recency of instruction increase the possibility of having target-like acceptability judgments. On the other, (i) none among these factors speeds up reading times or affects reading patterns (both early and late measures); (ii) inter-subjects variability is high and (iii) processing is still non-optimal. Duration of fixations and total reading times of non-alphabetical (Chinese) learners – independently of whether they spot the error or not – are way longer than native speakers' (table 2). But also when the most recently instructed, alphabetical-L1 learners seem to pattern alike with native controls in acceptability judgments, their reading is not disrupted when illegal auxiliaries occur (table 3). I conclude that either our subjects' performance reflect only a declarative knowledge of auxiliaries or – as long as learners are not "attuned" to the target-language and as long as their processing is still non-optimal – eye tracking measures – unlike ERP's – are unlikely to reveal whether a procedural rule for auxiliary selection is at work. Against the view that only complete L2 representations permit to full-parse the L2 input and that comprehending a sentence of a second language presupposes prior knowledge of the grammar of that language, L2 processing can be regarded at as "non-optimal" not because of a competence deficit, but because the parser itself can not (still) reflect that knowledge. In its turn, ineffective processing may be due to a learner's preference for effortless, "economy parsing" or to developmental factors that causes a temporary parser deficit. In both cases, eye-tracking data are inconclusive to prove whether initial L2 processing is fed by L2 grammar or not. Rather, they suggest that the developing of L2 grammar is not transparent to reading measures – especially at initial stages – and that it is eclipsed by the temporary ineffectiveness of the parser/processor.

Table 1: Dimensions of between-groups variability: (i) n. = number of subjects; (ii) L1 = subjects' first language; (iii) α = alphabetical L1; (iv) exposure to the target-language in Italy (in months); (v) instruction = sum of months of previous instruction and in Italy; (vi) recency of instruction (in months) = "+" = currently attending courses for...months; "-" = no more attending courses since...; (vii) degrees of proficiency (1-6) reflect the levels of the Common European Framework of Reference for languages.

Group	N.	L1	α	Exposure(m)	Instruction(m)	Recency	Proficiency
A	4	German, Romanian Polish, Croatian	yes	3.25	7.75	+3	A2
B	9	Chinese	no	25.2	7.8	-16.8	A2
C	12	Chinese	no	3	5.4	+2	A2
Control	7	Italian	yes	na	na	na	na

Table 2: average total reading times (TRT), total reading times on critical zones (TRT-C) and first pass reading times on critical zones (FP-C) per group (in ms.)

Group	TRT	TRT-C	FP-C
A	3789	1513	574
B	6035	2024	690
C	4410	1359	603
Control	1873	618	316

Table 3: the average number of fixations on critical zones with illegal auxiliaries increase exclusively in N controls