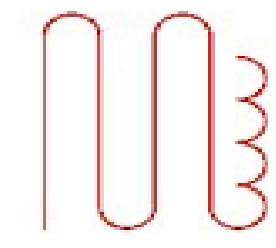


# Writing Units or Decades First in Two Digit Numbers Dictation

## Task: The Case of Arabic an Inverted.



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Mind  
Brain  
Body  
Symposium

### introduction

**In Arabic, as in German the oral counting system has the inversion feature (24 = four and twenty).**

Arabic, like Hebrew and Persian, is written from **right to left** while **math** is written from **left to right**.

Thus, in **Arabic**, the order of units and decades in the oral counting system does **NOT** correspond with the order of units and decades in the written counting system but **DOES** correspond with the direction of reading and writing of words.

The current study examines how the transparency and inversion features of word numbers influence the pattern of two-digit numbers writing especially the writing order of units and decades in transcoding to dictation task across lifespan.

### Word number system in Arabic

Children who are beginning to count must memorize the words of one-digit numbers from one to nine and, subsequently, the number words for 10, 11, and 12.

The word numbers for 13 to 19 can be derived from the one-digit word numbers, whereas the word numbers for 11 and 12 are not consistent, e.g. "11-أحد عشر" and "12-اثنا عشر (تناش\تناعش)"

"1-واحد" "2-but-12- "إثنا عشر (تناش\تناعش)" and "11-أحد عشر (حداش\حدعش)" "إثنين (تئين\ثنين)".

After learning the teens (11-19), Arabic-speaking children should also memorize the names of whole tens (20, 30, 40...) that are identical or similar to one-digit word numbers adding the suffixes "ون \ ين" at the end (6=ستة, 60=ستة+ين = ستين \ ستة+ون = ستون).

Moreover, the order of unit and decade word numbers in two-digit numbers is reversed in Arabic; for example, 18 is called "eight-ten" ("ثمانية عشر\ثمنتاش\ثمنتعش") and 27 is called "سبعة وعشرين".

### Method

**Participants** - 77 pupils (56 male, 21 female) from primary school, 66 pupils (52 male, 14 female) from junior high school, 72 pupils (45 male, 27 female) from high school and 72 students (38 male, 34 female) from higher education. All participants spoke Arabic as their first language (L1).

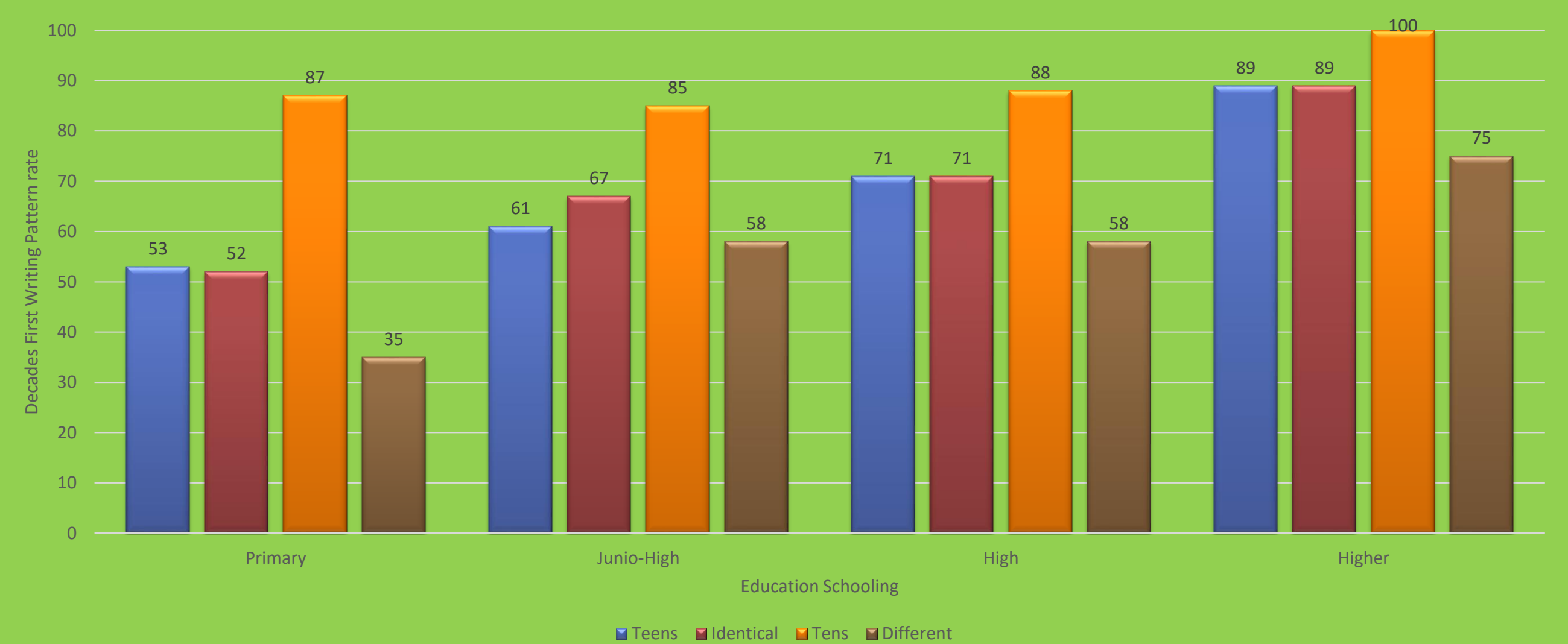
**Task** - The transcoding tasks consisted of the writing of 36 two-digit numbers pre-recorded by the experimenter. The numbers ranged from 10 and 100 and included 8 numbers from four two-digit numbers categories: (1) Teens-numbers 12-13-14-15-16-17-18-19, (2) Identical units and decades- numbers 22-33-44-55-66-77-88-99, (3) Whole tens-20-30-40-50-60-70-80-90 and (4) the rest remaining two-digit numbers. The order in which numbers were presented was random for each participant.

### Findings

In general, that Arabic speakers adopt decades first writing pattern in in most transcoding of two-digit numbers (78%) and only (22%) units first writing pattern.

An interaction was observed between the educational schooling - primary, junior high, high and higher education and the number categories – teens two-digit numbers, identical units and decades two-digit numbers, whole tens two-digit numbers, and the remaining two-digit numbers.

**Figure 1 : Decade writing pattern rates according to two-digit numbers category (teens, identical, tens, different) and education school (primary, junior-high, high, higher).**



### Conclusions

In general Arabic speakers adopt decades first writing pattern of two-digit numbers especially when it is consistent with syntactic structure of two-digit numbers as in whole tens.

This first decade writing pattern becomes more evident in junior-high school, high school and higher education since the proficiency and skills in math, second and third languages improves.

However, this pattern is modulated depending on a complexity of the units and decades structure that requires more working memory capacity.

This complexity is more pronounced in two-digit numbers, where the numerical syntactic structure is more evident than in numbers with a less prominent numerical syntactic structure (numbers 19-12) or in identical units and decades numbers compared to the remaining two-digit numbers category (with an evident syntactic structure of units and decades).

Additionally, influences were claimed because of the consistency or inconsistency between the reading direction of text (Right to Left), two-digit numbers reading (Right to Left) in Arabic and math writing direction taught (Left to Right) placing less or more load on working memory.



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