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Indirect Spaced Repetition Software (ISRS)

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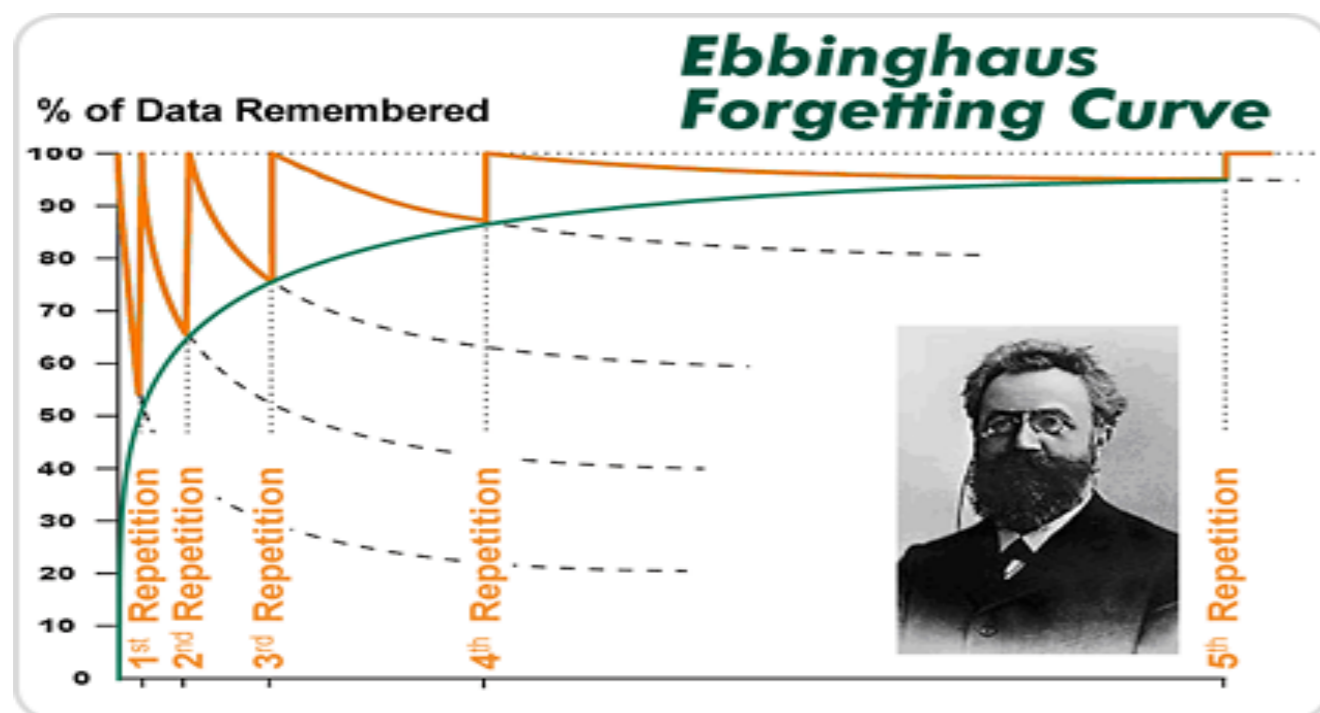
Integrating Key Ideas from Vocabulary Acquisition, Cognitive Psychology and Mechanical Engineering



Goal: Conceptualize, develop and test a prototype of a spaced repetition software.

Flow: There are four parts to understanding ISRS and how it can be used for vocabulary study.

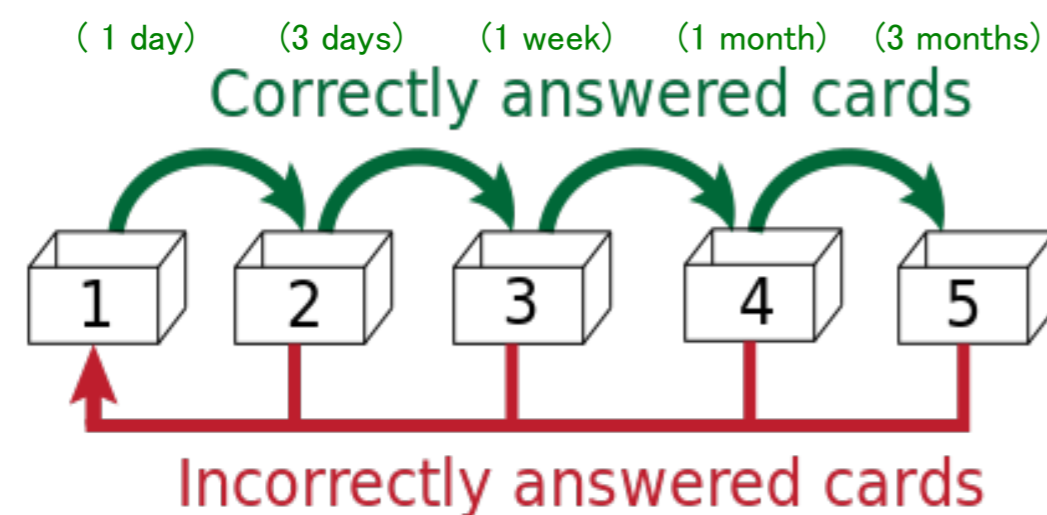
① Understanding Spaced Repetition System / Software (A well-known and extremely efficient knowledge review system)



Hermann Ebbinghaus' many discoveries in the late 1800s including the "spacing effect" which accounts for why learners have better memory retention when they engage in spaced learning (multiple but short study sessions) were ground-breaking.

This discovery has now been substantiated by more recent discoveries in neuroscience have confirmed that spacing repetitions at appropriate intervals allow for enough time for the neuro-chemical regeneration to occur which is necessary for establishing and strengthening brain connections (Baddeley, 1990)

Sebastian Leitner (1972) "The Leitner System"



(A flashcard study system elaborated for learners' to take advantage of the "spacing effect")

- His 5-step process uses a "learning box" with five compartments (each with a separately scheduled review time) which enables word cards to move up a compartment when successfully reviewed or go back to the first compartment when unsuccessfully reviewed.

- In more recent years, Leitner's system would often become the inspiration or basis for current spaced repetition software (SRS) according to Godwin-Jones (2010).

② Ideas from the Field of Vocabulary Acquisition

- Nation (2001) has suggested an "in-depth" learning of vocabulary to assure the correct "use" of the words in terms of output and points to the importance of mastering all three elements/features of word knowledge: 1-Meaning ② 2-Form ③ 3-Use ④
- Nation (ibid) has also recommended a balanced teaching approach between the "four strands of vocabulary teaching": 1-Meaning-focused input, 2-Meaning-focused output, 3-Language-focused learning, and 4-Fluency development.
- Schmitt (2008) implied that different teaching approaches may be more beneficial for different stages of word (lexical feature) knowledge as some are mastered earlier than others; therefore focusing on the form-meaning link at first and later enhancing context(use) may prove to be effective.
- The National Reading Panel (2000) recognized (guided oral) reading activities as being an effective way to develop fluency. Such an activity could easily follow the completion of a flashcard set and display the specific dialog or text where the word items were taken from.

③ An Idea from Mechanical Engineering

- Integrating a dynamic systems approach based in the world of mechanical engineering (CVT continuously variable transmission) to allow the software itself to customize interval times on-the-fly through automated data analysis (success rates per item/interval/question types, and optionally response speed) to better meet individual learner's needs.

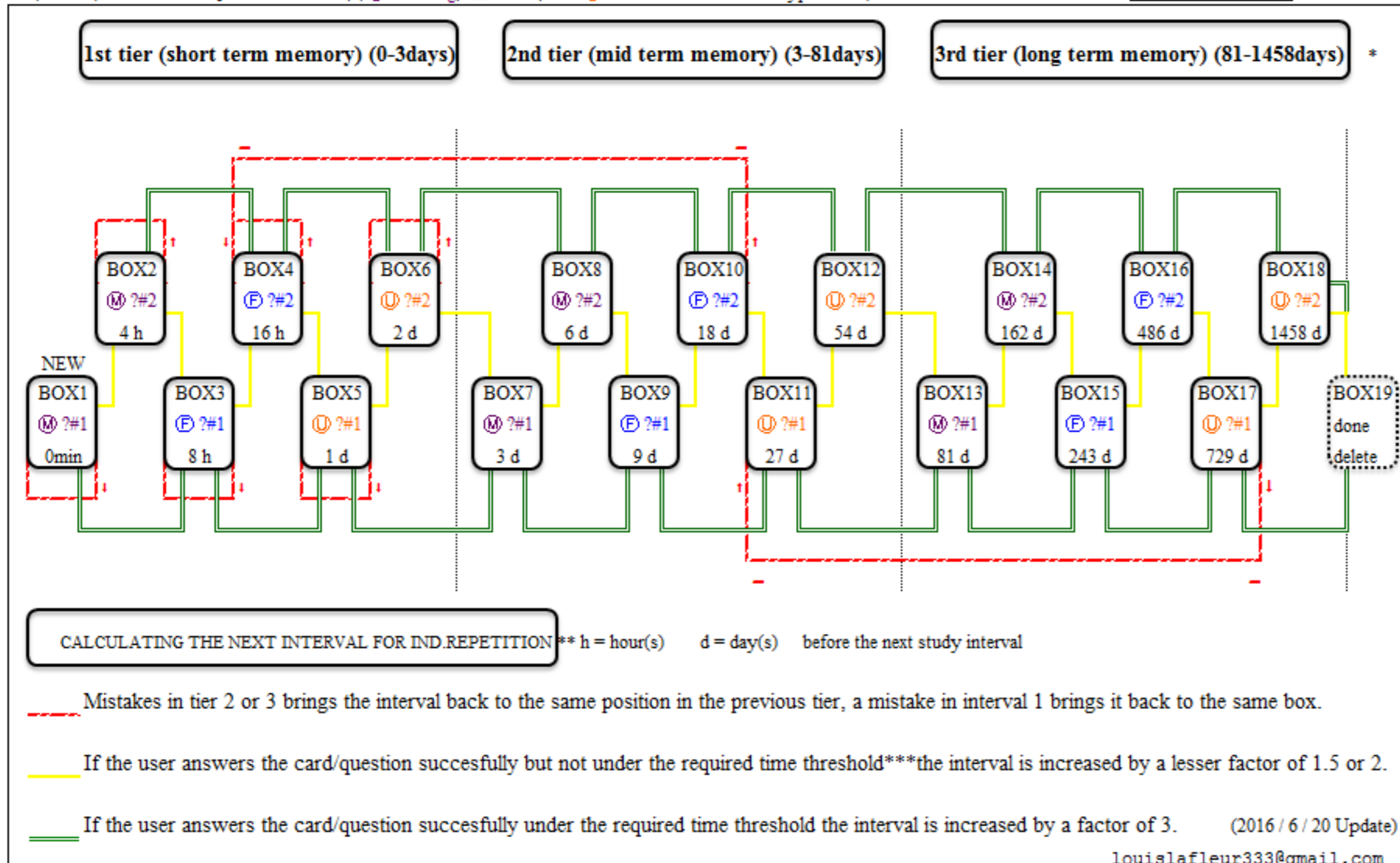


④ ISRS Explained in a Nutshell

In comparison to other spaced repetition softwares (SRS), additional tasks or questions for a same word item are not incorporated as additional flashcards (which could possibly cause overlapping and subsequently reduce the "spacing effect") but under the same original digital flashcard which cycles task/question focus between Meaning ②, Form ③ and Use ④ according to the reached interval.

Indirect Spaced Repetition System/Software (ISRS)

(Table 1) 3X2 Variable Questions Version, (② Meaning, ③ Form, and ④ Use with two variable types each)



(Table 2) Examples of possible questions/tasks for each word flashcard

?# Level	Flow	Task Type
② ?#1 Word	ENG audio to JPN word	Multiple Choice
② ?#2 Word	JPN word to ENG word	Multiple Choice
③ ?#1 Word	ENG audio to ENG word	Spelling/Writing
③ ?#2 Sentence	ENG (blank) to ENG word	Multiple Choice
④ ?#1 Sentence	JPN sentence to ENG sentence	Writing
④ ?#2 Sentence	ENG sentence to JPN sentence	Writing
(+) ?#7 Text	Reading and Listening (all ENG)	Voiced Reading

ENG = English / JPN = Japanese

* Given names and range of memory tiers are used here for the sake of presentation. Memory span is of a continuous nature and normally shouldn't be artificially segmented.

** Specific interval times may also be customized on-the-fly automatically through the collection of various user data.

*** Setting an answer time threshold within ISRS is optional. However, some developers may choose to set specific times for questions or use collected data to automatically modify interval times.

(+) For increased effectiveness, ISRS can be combined with a fluency building (voiced) reading activity. For example, studying a set of word cards once could trigger such a task.