

A Verbal Spatial Morphology and Mobile App for English as a Foreign Language

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Abstract

Ubiquitous learning requires learning objects to be available at the right time and place. EFL/ESL learners face confusion in their use of English verbs, but appropriate learning objects enable learners to creatively imagine and navigate grammatical schema. A spatial morphology of English verb forms and tenses is advanced, and applied to generate simple sentences without objects. Its structure enables the language learner to form adequate cognitive structures in the mind's eye. This is complemented by its use in interactive applications for smart phones and tablets. The spatial morphology offers an *aide-mémoire* to the learner, and educational App for the iPad.

Key Words: EFL, verb, tense, app, spatial morphology, ubiquitous learning, language learning, iPad.



Fig. 1. Touch gesturing on the iPad and iPhone.

1. Introduction

Fiaidhi observes that for effective ubiquitous learning, learners need access to appropriate learning objects at the right time and place [1]. English is fundamentally a verbal language; given its complexity it is no surprise that EFL/ESL students face confusion in their recall and use of the English verb tenses and forms appropriate to an intended communicative act. Naturally, the best place to locate such learning objects is within the learner's own awareness, so that they can form cognitive structures that are adequate. They can then creatively imagine and navigate the necessary schema, and determine the correct formal expression for what they intend. My spatial morphology of English tenses and forms provides for effective learning through offering appropriate cognitive schema, with an interactive mobile app for support.

The visual spatial structure is *imageable*: it allows the learner to visualize the schema in their imagination, and manipulate and navigate it in the mind's eye, to support retention and further use. This process is assisted by the spatio-visual nature of the schema, in contrast with the oral structure of natural language. *Spatialization* allows for ready implementation in visual interactive digital resources i.e. for on-screen displays. It can be realized in mobile apps for smart phones, tablets like the iPad [2], head up displays (for gamers, pilots, etc.), and electronic dictionaries and online resources. The primary intended realization of the spatial morphology is thus two-fold: it functions as an *aide-mémoire* in the learner's mind; and it provides the formal grammatical structure for a learning App for correct cognitive structures.

2. Structure and Use

2.1. The spatial morphology

The spatial morphology, used in the sense of formal organization, derives from traditional configurations of art and architecture that have historically enabled complex learning. The geometrical form is of the *aedicule*, here represented as a flat vertical rectangular surface in the normal field of vision. The fundamental Infinitive form of the verb is imagined at the center, but is then displaced to the upper right for convenience. An inner zone displays the verb's four aspects, sentences that accord with those aspects, their construction, and their use. A peripheral border displays the other major grammatical categories.

For the inner quadrant, the starting point for the basic grammatical Aspects is the Simple verb at bottom left, as in Fig. 2. Extension of the Simple to the right gives the Continuous form of the verb at bottom right. An octave of the Simple above gives the Perfect at top left. Extension of the Perfect to the right - an octave directly above the Continuous - gives the Perfect Continuous at top right.

The peripheral border of interactive buttons, tabs, and drop-down menus accommodates the other major grammatical categories. The important TENSE-ASPECT-MODE dimension is provided vertically, as in Fig. 2. The base form of the verb, the bare Infinitive, is entered or selected from a drop-down menu in the major right-hand top field. Grammatical categories of QUALITY (i.e. Finiteness), NUMBER, VOICE and POLARITY are minor side options of the top and bottom borders. NUMBER at right top works with PERSON and GENDER in the right border. MODE at bottom is differentiated into major Fields of MOOD at left and MODALITY at right, as in Fig. 2. Contextual fields expand these options in the left border. Learners need to avoid unnecessary complexity, so Realis and Irrealis moods are not dealt with. Similarly, the App is restricted to Intransitive or Optionally Transitive verbs, and sentence objects are not included.

2.2. Usage

The user firstly selects a base verb at top right from a drop-down menu, or enters one with intelligent word recognition and completion. Options are then selected from the border for the intended communicative act. Minor side fields on top and bottom borders offer exclusive binary “or” choices, but for NUMBER, where neither, either, or both options can be selected.

QUALITY (Finiteness) provides for Finite or Non-finite Verb form, as in Figs. 6 and 7; VOICE allows for Active or Passive form, as in Figs. 4 and 5, while POLARITY allows for Affirmative or Negative form, as in Figs. 4a and 4b.

P	QUALITY	TENSE	VERB	NUMBER	PC
MOOD and MODALITY - EXPANDED	PERFECT		PERFECT CONTINUOUS		PERSON
	SIMPLE		CONTINUOUS		GENDER
S	VOICE	MOOD	MODALITY	POLARITY	C

P	finite / non-finite	past	present	future	VERB				singular / plural	PC	
- will vary according to mood and modality selection -	<div>perfect</div> <div>(typically: <i>connection between events in time; completion of something by a particular time</i>)</div>				<div>perfect continuous</div> <div>(typically: <i>continuity up to a particular time</i>)</div>					first / second / third	
										male / female / neutral	
	<div>simple</div> <div>(typically: <i>events in time; permanent situations</i>)</div>				<div>continuous</div> <div>(typically: <i>events as going on or continuing, perhaps at or up to a particular time</i>)</div>					male / female / neutral	
S	active / passive	declare	question	direct	subjunct	non-modal	modal	semi-modal	other	affirmative / negative	C

P	1	∞	past	present	future	VERB					NUMBER	PC	
- will vary according to mood and modality selection -	TENSE QUALITY (FINITENESS)					VERB					NUMBER		
	PERFECT perfect					PERFECT CONTINUOUS perfect continuous					PERSON		
	SIMPLE simple					CONTINUOUS continuous					GENDER		
	VOICE					MODALITY					POLARITY		
S	I	—	declare	question	direct	subjunct	non-modal	modal	semi-modal	other	+	—	C

Fig. 2. Development of App interface: how main grammatical categories are disposed, differentiated, and presented.

P	1	∞	past	present	future	VERB	□	<div><div>□</div><div>□</div><div>□</div><div>□</div></div>	PC	
(default non-modal prompts)	_ have VERB-en perfect					_ have been VERB-ing perfect continuous				1st
										2nd
	_ VERB simple					_ be VERB-ing continuous				3rd
										♂
									♀	
									⚡	
S	I	—	declarative mood			non-modal	+	—	C	

	P	1	∞	past	present	future	walk	NUMBER	PC				
- will vary according to mood and modality selection -	I have walked _ have VERB-en present perfect <small>(typically: past action with some present connection)</small>		I have been walking _ have been VERB-ing present perfect continuous <small>(typically: continuity up to the present)</small>		PERSON	1st	2nd	3rd					
	I walk _ VERB present simple <small>(typically: general time; permanent situations)</small>		I am walking _ be VERB-ing present continuous <small>(typically: actions continuing at the moment of speaking)</small>		GENDER	♂	♀	+♂					
S	I	—	declare	question	direct	subjunct	non-modal	modal	semi-modal	other	+	—	C

P	1	∞	past	present	future	walk	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
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Fig. 3. Further development of the interface for base Finite/Present/Active/Declarative/Non-modal/Affirmative.

Major border fields offer multiple options. TENSE is contextual, and for non-modal Finite Quality, provides exclusive Past/Present/Future as in Fig. 5. For Non-finite QUALITY, in Fig. 7, options depend upon other settings e.g. Active/Passive VOICE. MOOD, at bottom left in Fig. 4, provides for exclusive Declarative/Interrogative/Imperative/Subjunctive forms.

The contextual menu along the left border may be activated by these choices, e.g. for Interrogative Question, the left border shows Wh- question words *who/what/where* etc. as prompts as in Fig. 3, and/or toggles with Polar question words such as *do/did/is/are/will* etc. MODALITY at bottom right provides for exclusive Non-modal/Modal/Semi-modal/Other modal. For Modal, as in Fig. 6, the left border displays Modals *may/might/can/could* etc.

P	1	∞	past	present	future	walk	□	PC
you had walked						you had been walking		1st
_ had VERB-en						_ had been VERB-ing		2nd
past perfect						past perfect continuous		3rd
(typically: action before a particular past time)						(typically: continuity up to a particular past time)		
you walked						you were walking		♂
_ VERB-ed						_ been VERB-ing		♀
past simple						past continuous		♂
(typically: past events)						(typically: actions continuing at a particular past time)		♀
S	I	—	declare	question	direct	subjunct	non-modal	C

P	1	∞	past	present	future	eat	□	PC
they haven't eaten						they haven't been eating		1st
_ have not VERB-en						_ have not been VERB-ing		2nd
present perfect						present perfect continuous		3rd
(typically: past action with some present connection)						(typically: continuity up to the present)		
they don't eat						they aren't eating		♂
_ don't VERB						_ be not VERB-ing		♀
present simple						present continuous		♂
(typically: general time; permanent situations)						(typically: actions continuing at the moment of speaking)		♀
S	I	—	declare	question	direct	subjunct	non-modal	C

P	1	∞	past	present	future	walk	□	PC
will he/she/it have walked?						will he/she/it have been walking?		1st
will _ have VERB-en?						will _ have been VERB-ing?		2nd
future perfect						future perfect continuous		3rd
(typically: action before a particular future time)						(typically: continuity up to a particular future time)		
will he/she/it walk?						will he/she/it be walking?		♂
will _ VERB?						will _ be VERB-ing?		♀
future simple						future continuous		♂
(typically: information about the future; future events)						(typically: actions continuing at a particular future time)		♀
S	I	—	declare	question	direct	subjunct	non-modal	C

Fig. 4. Past, Present and Future Positive and Negative Declarative and Interrogative sentence constructions.

P	1	∞	past	present	future	walk	□	PC
he had been walked						he had been being walked (?)		1st
_ had been VERB-en						_ had been being VERB-en		2nd
past perfect passive						past perfect continuous passive		3rd
(typically: action before a particular past time)						(typically: continuity up to a particular past time)		
he was walked						he was being walked		♂
_ been VERB-en						_ been being VERB-en		♀
past simple passive						past continuous passive		♂
(typically: past events)						(typically: actions continuing at a particular past time)		♀
S	I	—	declare	question	direct	subjunct	non-modal	C

P	1	∞	past	present	future	walk	□	PC
she has been walked						she has been being walked (?)		1st
_ have been VERB-en						_ have been being VERB-en		2nd
present perfect passive						present perfect continuous passive		3rd
(typically: past action with some present connection)						(typically: continuity up to the present)		
she is walked						she is being walked		♂
_ be VERB-en						_ be being VERB-en		♀
present simple passive						present continuous passive		♂
(typically: general time; permanent situations)						(typically: actions continuing at the moment of speaking)		♀
S	I	—	declare	question	direct	subjunct	non-modal	C

P	1	∞	past	present	future	walk	□	PC
it will have been walked						it will have been being walked (?)		1st
_ will have been VERB-en						_ will have been being VERB-en		2nd
future perfect passive						future perfect continuous passive		3rd
(typically: action before a particular future time)						(typically: continuity up to a particular future time)		
it will be walked						it will be being walked		♂
_ will be VERB-en						_ will be being VERB-en		♀
future simple passive						future continuous passive		♂
(typically: information about the future; future events)						(typically: actions continuing at a particular future time)		♀
S	I	—	declare	question	direct	subjunct	non-modal	C

Fig. 5. Finite/Singular/3P/Passive/Declarative/Non-modal/Affirmative Tense and Gender constructions.

The right border differs in that choices need not be exclusive, but as for NUMBER may be partially or totally inclusive, and are intended to function in conjunction with the Number selection at right top. PERSON is selected as none, any, some or all of First/Second/Third. GENDER can be selected as none, any, some or all of Male/Female/Neutral. This allows the display of just one PERSON, in Fig. 5, or of a limited, or full conjugation.

P	1	∞	modal present				walk				□	PC	
			<i>I may have walked</i> _ may have VERB-en <i>modal perfect</i> <small>(typically: past action with some present connection)</small>				<i>I may have been walking</i> _ may have been VERB-ing <i>modal perfect continuous</i> <small>(typically: continuity up to the present)</small>						
			<i>I may walk</i> _ may VERB <i>modal simple</i> <small>(typically: general time; permanent situations)</small>				<i>I may be walking</i> _ may be VERB-ing <i>modal continuous</i> <small>(typically: actions continuing at the moment of speaking)</small>						
S	I	—	declare	question	direct	subjunct	non-modal	modal	semi-modal	other	+	—	C

P	1	∞	modal past				walk				□	PC	
			<i>couldn't she have walked?</i> could not _ have VERB-en? <i>modal past perfect</i> <small>(typically: action before a particular past time)</small>				<i>couldn't she have been walking?</i> could not _ have been VERB-ing? <i>modal past perfect continuous</i> <small>(typically: continuity up to a particular past time)</small>						
			<i>couldn't she walk?</i> could not _ VERB? <i>modal past simple</i> <small>(typically: past events)</small>				<i>couldn't she be walking?</i> could not _ be VERB-ing? <i>modal past continuous</i> <small>(typically: actions continuing at a particular past time)</small>						
S	I	—	declare	question	direct	subjunct	non-modal	modal	semi-modal	other	+	—	C

Fig. 6. Finite/Modal sentence constructions.

P	1	∞	infinitive	VERB	□	PC
1st			(to) have VERB-en perfect infinitive	(to) have been VERB-ing perfect continuous infinitive		1st
2nd						2nd
3rd						3rd
4th						4th
5th						5th
6th						6th
7th						7th
8th						8th
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93rd						93rd
94th						94th
95th						95th
96th						96th
97th						97th
98th						98th
99th						99th
100th						100th
S	I	—	declarative mood	non-modal	+	—

Fig. 7. Non-finite/Infinitive sentence constructions.

With each choice the inner quadrant displays the corresponding four Aspects of the specific verb base and chosen grammatical categories, thus showing four simple sentences, sentence constructions, tenses, and typical uses. A Verb form assumes the same relative position in each inner rectangle: for any given TENSE, as shown in Fig. 4, constant relations between the Simple, Continuous, Perfect, and Perfect Continuous aspects become evident, so helping the learner internalize the language structure.

2.3. Finger Gestures

Finger gesturing, as in Fig. 1, accords with Apple's iOS Human Interface Guidelines [3]. Single tapping a Finite ASPECT zooms the quadrant to fill the entire inner space, allowing detailed information to be displayed; tapping a zoomed interior collapses it to four-quadrants.

Horizontally swiping the interior cycles through the TENSEs: a right swipe regresses the Tense, while a left swipe advances it e.g. from Past to Present, or Present to Future. The swipe could also include the Infinitive, cycling through Past-Present-Future-Infinitive. If just one NUMBER and PERSON is selected, vertical swiping the interior zone allows cycling through Number/ Person combinations: 1PS–2PS–3PS–1PP–2PP–3PP. Swiping quadrants upwards/downwards then advances/regresses the Number/Person displayed: e.g. 2PS–3PS.

3. Pros and Cons

The App encourages playful exploration of various grammatical categories, thus allowing a deepening appreciation of the structure of the English language. Correspondences between verb forms for a particular tense can be seen in relation to the other tenses, as a Verb form assumes the same relative position in each configuration. This structure should assist learning.

The main limitations that are met are those of the structural complexity of language in general, and of the English language in particular. These must be set against the understandable limitations of the second language learner. A compromise needs to be made between a simplicity that can be comprehended, and a complexity that does justice to the target language. Thus the structural morphology presented does not address sentence objects, and is restricted to simple sentences, as opposed to compound and complex. Passive and non-finite forms have been simplified, as have imperative/subjunctive moods, and modalities.

The display resolution of 960x640 px equals that of the iPhone 4/4S screen, and fits comfortably on the 1024x768 px iPad 2 screen, as shown in Fig. 1. Color-coding enhances legibility; note that for limitations of space, images in this paper have been reduced in size.

4. Conclusion

The ICT revolution is radically impacting pedagogy, as I elsewhere discuss in some detail, particularly in regard to digital literacy [4], which has now become critical. In second language learning, the need is now evident for effective cognitive schema to utilize in conjunction with language learning strategies that are more tailored to the digital age. Fiaidhi maintains that the pervasive impact of the Internet, mobile apps, smart phones and tablets indicates learning objects are needed to satisfy demand for ubiquitous learning at the right time and in the right place [1]. Clearly, they need also to be in the right form. How language is conceived, imagined, learnt, and utilized is changing, as intuited by Hobari [5], and Van De Bogart [6]. It is my belief that envisaging and developing spatial morphologies that aid

learning, in dialectic between the space of the imagination and the digital realm of mobile apps, may contribute to this exciting educational evolution.

5. Acknowledgements

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6. References

- [1] Fiaidhi, J., Towards Developing Installable e-Learning Objects utilizing the Emerging Technologies in Calm Computing and Ubiquitous Learning, *IJUNESST*, 4:1 (2011), 1–12.
- [2] Meurant, R.C., iPad Tablet Computing to Foster Korean EFL Digital Literacy, *IJUNESST*, 3:4 (2010), 49–62.
- [3] Apple Inc., iOS Human Interface Guidelines. Apple Inc., Cupertino (2011).
- [4] Meurant, R.C., Applied Linguistics and the Convergence of Information Communication Technologies. The Opoutere Press, Auckland (2010).
- [5] Obari, H., Integration of E-Learning and M-Learning in Teaching EFL in Japan. PPT presentation, E-Learn 2009, Vancouver (2009).
- [6] Van De Bogart, W., Behavioral aspects of Thai students toward cell phone adoption in the classroom. International e-Learning Conference, Bangkok (2011), accessed 8 Jan 2012 http://www.earthportals.com/Portal_Messenger/willard.html
- [7] Meurant, R.C., Developing EFL/ESL Cognitive Structures Using a Mobile App to Exploit a Spatial Morphology of Verb Forms in Simple Sentences, *IJUNESST*, 4:4 (2011), 63–74.
- [8] Meurant, R.C., A Proposal for a Spatial Morphology of Verb Forms in EFL/ESL to Develop Cognitive Structures using Mobile Apps, *TESOL Review*, 3 (2011), 127–144.

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