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Identifiability and accessibility in learning definite article usages: A quasi-experimental study with Japanese learners of English

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Abstract

The present study investigated the effects of instruction on the use of the definite article *the* by Japanese learners of English by implementing two instructional treatments that varied in the extent to which they emphasized identifiability and accessibility. One instructional treatment, referred to as the traditional (TR) treatment, emphasized the linguistic/semantic notion of identifiability in which *the* serves to identify the referent. The other instructional treatment, operationalized as a mental space (MS) treatment, emphasized the cognitive notion of accessibility whereby *the* serves to mark an access path to the referent. The purpose of the comparison was to assess which types of metalinguistic information might be most effective for helping L2 learners of English to understand specific definite article usages.

Three computer-assisted language learning (CALL) lessons averaging from 1.5 to 2 hours each were given individually to 83 Japanese learners of English, 42 in the TR group and 41 in the MS group. Counterbalanced versions of an article test were administered as a pre-test (Time 1), an immediate post-test (Time 2), and a delayed post-test (Time 3). Both groups exhibited significant increases at Time 2, which were maintained at Time 3, while the between-group comparisons showed that the MS group significantly outperformed the TR group at both Times 2 and 3. The different treatments had differential effects depending on the article types, with the MS group performing especially well on the most difficult conceptual usages.

Keywords

Definite articles, cognition, computer-assisted language learning (CALL), explicit instruction

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I Introduction

The English article system is complex and multifaceted, yet is said to be one of the less commonly studied components of English grammar (Thomas, 1989). Early research stemming from interlanguage studies of natural speech samples from individual second language (L2) learners tended to reveal that the acquisition of *the* preceded that of *a* (Hakuta, 1976; Huebner, 1983; Parrish, 1987); as such, this early research was focused on the grammatical category of definiteness/indefiniteness. Pedagogically oriented research featured in a series of studies by Master (1994, 1997) also focused on definiteness-based identifiability, whereas Chaudron and Parker (1990) investigated the article from the perspective of topic continuity. More recently, theoretically oriented research has examined articles from the perspective of Universal Grammar (UG) parameters or first language prosodic structures, with analyses still fundamentally tied to definiteness and specificity (Goad & White, 2004; Ionin, Ko, & Wexler, 2004; Garcia Mayo, 2009). Still other studies have linked article acquisition with metalinguistic awareness (e.g. Butler, 2002; Liu & Gleason, 2002), with corrective feedback in the context of focus on form (Ellis, Sheen, Murakami, & Takashima, 2008; Muranoi, 2000; Sheen, 2007), or with implicit versus explicit knowledge (Akakura, 2012).

These studies have contributed a great deal to the field of second language acquisition (SLA), and many learners as well as teachers have benefited from them. However, some areas remain to be explored, one of which is a cognitively oriented investigation of articles and related instructional practices. Although the need has long been expressed by many scholars (Bowerman & Levinson, 2001; Celce-Murcia & Larsen-Freeman, 1999; Liu & Gleason, 2002; Master, 1994) and some studies have taken this direction (e.g. Trenkic, 2007), most article studies in SLA research have adopted a linguistic focus on definiteness, emphasizing reference and identifiability in tandem with semantic categories rather than a more cognitive orientation. The present study attempts to bring human cognition into language acquisition and to explore a cognitive approach to article acquisition, specifically drawing on Epstein's (2002) *mental space* approach to viewing and interpreting various usages of the English article *the*.

1 Identifiability

Traditionally, the definite article *the* is thought to express definiteness through the referential function of *identifiability*; that is, *the* is there to identify, pick out, or individuate the referent so that the hearer can identify what is being discussed (Lyons, 1999). This is a pragmatic, hearer-oriented view: definiteness is expressed through the use of *the* for the benefit of the hearer, so that the hearer can determine what is being talked about; that is, a noun phrase (NP) with a definite article must be uniquely identifiable (Christophersen, 1939; Hawkins, 1978; Lyons, 1999; Searle, 1969).

Epstein (2002) summarized this traditional view as follows: for an NP to be used with *the*, the NP must be (a) identifiable, (b) unique, and (c) familiar to both the speaker and hearer. That is, the referent must be locatable in a given discourse and the main task of the hearer is to identify the aforementioned referent. This time-honoured view has been widely accepted and has long served as the foundation of research and pedagogical

orientations. Recently, however, this notion has been criticized for being insufficient in explaining all uses of *the* (see Epstein, 2002; Lyons, 1980, 1999). Lambrecht (1994), for example, points out that equating the paired notion +/–*identifiable* with another paired grammatical category of +/–*definite* is not a fair equation. That is, there is no obvious one-to-one mapping between the categories of identifiability and definiteness in a given NP with respect to its referent.

Greatly influenced by Hawkins' (1978) idea of inclusiveness (i.e. location, familiarity and shared sets), Lyons (1999) concluded that definiteness is a unified phenomenon and he tried to dichotomize the usage of *the* into two conceptual categories: (a) identifiability and (b) inclusiveness. Identifiability is characterized by a referential function (i.e. the referent can be identified in a physical context in concrete terms), whereas inclusiveness is characterized by a non-referential function (i.e. the referent can be identified in an abstract sense via associations with location, anaphora, and general knowledge). Lyons added, 'Indeed many uses are handled by either one of these concepts [identifiability or inclusiveness]. But neither works for all uses' (p. 253). The notion of inclusiveness, although not solely attributable to Lyons, overlaps with cognitive interpretations of *the*, which, as we explain next, posit conceptual connections with respect to the context in which the referent is to be found.

2 *Accessibility*

Epstein (2002) proposed a way other than through identifiability to deal with definiteness. Drawing on both McCawley (1979, 1985) and Hawkins (1991), he argued that 'definite descriptions are interpreted with respect to an array of pragmatically determined subsets or domains within the universe of discourse' (Epstein, 2002, p. 340). That is, it is not solely identifiability that accounts for the use of articles, *something else* must be at work as well. This *something else* must be the dynamic cognitive activity that is constantly taking place between the speaker and hearer in the universe of discourse. After empirically examining the usage of *the* in various published materials, Epstein (2002) posited that the basic meaning of the article is to signal the accessibility of a discourse referent: *The* signals 'the availability of an access path [a low degree of accessibility] through a configuration of mental spaces or cognitive domains' (p. 333).

Following this perspective, the constructs of interest in the present study, in addition to identifiability, entail the cognitive notions of framing, viewpoint, and conceptual connections, and thus draw specifically on mental space theory (Fauconnier, 1994; Sweetser & Fauconnier, 1996). Like frame theory (Fillmore, 1985; Fillmore, Wooters, and Baker, 2001) or frame semantics (Johnson et al., 2001), mental space theory is a cognitive theory that seeks to explain the interplay between linguistic knowledge and human cognition; its main focus is how humans access and process linguistic information that is available to them. Drawing on Fauconnier (1994), Epstein (2002) describes this processing as 'the construction of a succession of hierarchical configurations of "mental spaces" [which are] are constantly updated as the discourse progresses' (p. 341). He continues:

> The range of possible space configurations is constrained by linguistic and pragmatic factors, but individual sentences by themselves do not explicitly spell out a single, precise configuration.

> […] Speakers and addressees determine the appropriate configuration in any given situation by taking into consideration grammatical clues, the previous discourse context, aspects of the immediate situation, general background knowledge in the form of frames, cultural models, folk theories, etc. (Epstein, 2002, p. 341)

Because linguistic structures are always interpreted through mental space configurations, the meaning of language, even at the level of a word such as *a* or *the*, is not achieved solely through linguistic expression. This is particularly true in the case of the article *the*, which is defined as 'a "grammatical word" with no descriptive lexical content and therefore contains nothing which can itself identify a referent' (Lyons, 1999, p. 6).

3 Exploring pedagogical implications

Drawing on mental space accounts of article usages, the present study was designed to explore the pedagogical potential of emphasizing accessibility as a means to help L2 learners to interpret the English definite article. The study examines both traditional grammar-based and conceptual-based approaches and their effects on L2 learners' understanding of different article usages. Although our investigation inevitably appears dichotomous, we acknowledge a great deal of overlap between grammar-based and mental space approaches. The purpose of this study, therefore, is not to claim the superiority of one instructional approach over another, but rather to contribute to our knowledge of what types of metalinguistic information might be most effective for helping L2 learners of English to understand specific types of definite article usages. In our view, this question has considerable importance for learners whose first language has no comparable morphological equivalent to the English counterpart to express definiteness, including plurality and mass nouns. Despite the absence of linguistic equivalents in their first language, we suggest that such learners are nonetheless equipped with a cognitive capacity for interpreting article usages through mental space configurations. To operationalize a mental space approach as an instructional treatment emphasizing the cognitive notion of accessibility (whereby *the* marks an access path to the referent), we employ the notion of schemata. As we explain next, a schema brings together three intertwined elements that are requisite for cognitive-oriented meaning interpretation: namely grammar, context, and conceptual connections (Fauconnier, 1994; Fillmore, 1985; Johnson et al., 2001; Lakoff, 1987; Talmy, 2000).

4 The use of schemata in cognitive meaning interpretation

A schema is a body of knowledge that is acquired through experiences in life and is stored (to be accessed) in our mental dictionary. A schema thus has both contextual and conceptual dimensions in that it represents both real and hypothetical worlds. The real world dimension is more contextually inclined, such as the immediate discourse world that the speaker is currently facing and/or the past situations that the speaker has experienced. The hypothetical world is more conceptually inclined, such as imagined discourse environments that speakers can create (or recreate) in their mind on the basis of past experiences. A schema thus contains many elements: speaker, listener, language, context of utterances,

surrounding environment, cultural elements, and conceptual and pragmatic relevance. Because of these many interconnected factors, a schema relates the grammar (the structure, the organization of language) with the context of the situation (participants, background, conversational goal) as well as with concepts such as pragmatic function, metaphor, metonymy, conceptual connection, memory, knowledge, and culture specifics (Chafe, 1994; Fillmore, 1985; Lakoff, 1987; Lambrecht, 1994; Langacker, 1993).

Schematic interpretation is thus achieved by capturing the discourse as an event frame and interpreting the article *the* in its framed context in which accessibility (via an access path) can be either contextually or conceptually established. How is such a framed context captured? One simple way is with the use of a mental camera or mental picture, a technique used to explain the article in the present study. When talking about dinner, for example, we are able to conjure up every aspect of a dinner: we can zoom in or focus on any part of the *dinner* schema that is current or stored and accessed as a unit or a package to describe (or interpret) the situation, and also the things and objects that are concerned. In our view, the usage of *the* involves the focusing or zooming mechanism of this type of conceptual camera a great deal. The mental camera is movable as the discourse progresses. When we read a sentence or hear an utterance, we subconsciously try to interpret its meaning through grammar while simultaneously visualizing the scene conceptually. A schema can help express hidden knowledge, unspoken information or messages of the sort needed for an interpretation. A schema thus makes it conceptually possible to conjure up such a referent (*the* + noun), either concretely by reference or abstractly by inference (see Lyons' inclusiveness, above).

5 *Four usages of* the *from two theoretical perspectives*

To collect baseline data for this investigation, a range of published materials was examined, and more than 200 sentences and 20 passages containing mostly non-generic usages of *the* were randomly extracted. The examples were then sorted according to grammar, context, and conceptual connections, and the following four distinct article types emerged:

Type 1 (Structural): *I saw a cat and a dog in the garden. The cat was chasing a mouse.*
Type 2 (Visible in the situation): *Here is the bathroom*.
Type 3 (Visible in the mind): *Where is the bathroom please?*
Type 4 (Inclusive/associative): *I've just been to a wedding. The bride wore blue*.

Roughly speaking, Types 1 and 4 can be said to share the grammatical features of direct and indirect anaphora and style of speech. Types 2 and 3 also share certain grammatical as well as pragmatic features typical of dialogue; contextual features are particularly prominent in such situations where requests are expressed without anaphoric reference. In the following analysis of each type, we first present a grammar-based interpretation followed by an interpretation based on mental space theory.

a Type 1: structural usage. Type 1 usage (e.g. *I saw a cat and a dog in the garden. The cat was chasing a mouse*) is relatively easy to understand because of the self-evident nature

of the grammatical structuring (i.e. *a cat* becomes *the cat* in a typical case of structural anaphora). Given the distinct structural accessibility of Type 1 usage (*a→the*), only six words separate *a cat* from *the cat*, thus facilitating their interpretation by learners. Arguably, this usage represents a blueprint of identifiability that ideally fits into the traditional description of definiteness. Pinpointing the referent (*a cat* becomes *the cat*) is absolute and no ambiguity is involved (Lyons, 1999). Differences between a grammar-based approach emphasizing identifiability and a mental space approach emphasizing accessibility are perhaps negligible when grammatical structuring is at play in this way.

b Type 2: visible in the situation usage. Type 2 usage (e.g. in a house: '*Here is the bathroom'*) is contextual because the referent is visible in the situation in the sense of definiteness. For the traditional grammar-based explanation, the visibility of the referent clearly provides conditions for identifiability and pinpointing the referent as a specific object is pragmatically unambiguous: Hawkins' (1978) location theory explains this usage very well. In terms of accessibility, a mental space explanation is similar: that is, the intended object is accessible to both the speaker and the hearer because of its visibility in the situation. To process the utterance, one can easily imagine where the interlocutors are in relation to *the bathroom*. Type 2 can therefore be explained through both accounts. For this usage, the visibility of the referent and its proximity are both crucial.

c Type 3: visible in the mind usage. Type 3 usage (e.g. in a house: '*Where is the bathroom, please?*') is both contextual and conceptual and so the traditional notion of identifiability on its own is limited. The speaker does not know where the bathroom is at the time of the utterance (the bathroom may not even be there or there could be multiple bathrooms), yet *the* is used to describe it: the definite use of *the* in the pragmatic sense of identifiability (pinpointing) is theoretically tenuous. Among the grammar-based explanations of specificity, familiarity, or uniqueness, the best explanation might be familiarity in the sense of shared knowledge.

A comparison of Types 2 and 3 reveals the limitations of a structural approach and points to the need for a more conceptual explanation. When both framing and point of reference are concerned, the difference between Types 2 and 3 lies in the discourse context: Type 2 represents the object (*bathroom*) as visible in the situation, whereas in Type 3 the object is not visible in the situation, but visible in the mind. Although *the bathroom* in both types is the intended object, and *the* can be used in both instances, when a cognitive schema-based interpretation is applied, these usages of *the* are different. The same NP (*the bathroom*) does not depict the same image.

In the accessibility view, the invisible bathroom is understood to be an expected bathroom (as a representation) in the same location where the speaker happens to be. This is an important notion. Although the bathroom is not actually in sight, the speaker is conceptually visualizing the presupposed bathroom in his or her mind; the speaker's internal dialogue could be 'there must be such a thing' in such a place as Lyons' (1999) explanation implies, thus instantiating a presupposition or expectation and establishing psychological indexing of the referent. Both interlocutors know exactly which bathroom is being referred to. In these usages, identifiability in the sense of pinpointing the actual

referent is not so much at play, whereas making an access path in the sense of inferencing is (*the* in *the bathroom* is related to *the building* or *house* where the speaker is, not the bathroom in the next building).

d Type 4: inclusive/associative usage. Type 4 usages (e.g. '*I've just been to a wedding. The bride wore blue.*') are 'probably the most frequently used' (Lyons, 1980, p. 85), but are seldom shown in textbooks. With a traditional grammar-based analysis, there is an obvious absence of an antecedent (*a bride* cannot be found in the preceding sentence) and, therefore, *the bride* appears as a newly introduced word. Even though *a wedding* is already introduced in the first sentence, there is no direct anaphoric connection readily available to the learner, who needs to be aware of the conceptual connection whereby the word *wedding* typically triggers related entities such as *bride, groom*, and *guests*.

Type 4 usage – more typically referred to as inclusive, associative, or indirect anaphora – is thus not easily explained through the usual notion of identifiability, and its complexity has been well remarked. This is where the traditional grammar-based explanation becomes theoretically insufficient (Lyons, 1999). This inclusive or associative usage is indirect with respect to anaphoric reference and abstract in the sense of pinpointing the referent. This abstractness comes from two sources, as noted by Jespersen (1943). One source, as in the Type 3 example, comes from the relationship between the referent (i.e. bathroom) and its non-linguistic elements, which are neither written nor spoken, such as a building or a house in which the bathroom in question is located. The other source of abstractness comes from the relationship between the referent (i.e. *bride*) and its related entity (*wedding*) in a given discourse as shown in the Type 4 example. In some utterances, for example, the location of the speaker (in a building) is not explicitly expressed or described, but is understood by the interlocutors. This type of unspoken information is nonetheless conveyed by means of intricate schemata inherent to grammar that all humans possess – this is cognitive structure. The same can be said of the relationship between *a (the) wedding* and *the bride* in Type 4; both are instantiated in the same discourse world as a mental space configuration. This type of explanation can be more effectively derived from cognitive structuring than from a grammatical structuring or even the semantic explanation of familiarity.

II Research questions

The identification of four usages of the definite article in English leads to implications for L2 instruction that the present study endeavours to put to the test. First and foremost, the identifiability-based approach seems especially useful for explaining Types 1 and 2 usages but not to the same extent for Types 3 and 4, which are more cogently explained by the accessibility-based approach. The latter entails a different type of processing that extends a learner's discourse world beyond the sentence level, towards an implicit awareness of an intended object that is not there in the situation but is expected to be, and so can be qualified with *the*. This is an important concept but not an easy one for learners to grasp, unless explained using the accessibility-based context. Because identifiability and accessibility entail different cognitive processing in terms of learners' understanding,

instructional treatments that variably emphasize one or the other are predicted to yield different learning outcomes among the different types of *the*.

The present study investigates the differential effects of teaching the English article *the* through two instructional approaches that vary in the extent to which they emphasize identifiability and accessibility. Two comparable computer-assisted language learning (CALL) treatments were created, one following a traditional identifiability-based approach (TR henceforth) and the other a mental space accessibility-based approach (MS henceforth). The TR treatment draws on a framework in which 'identifiability of the object' is emphasized, using the well-known notions of specificity, familiarity, and uniqueness. The MS treatment draws on a framework in which 'accessibility to the object' is emphasized, taking into account the configuration of a discourse world through a schema-based approach in which explanations focus on (a) the visibility or (b) invisibility of the object, and (c) conceptual connections (i.e. membership relations among entities). The research questions are formulated as follows:

1. How are the accuracy scores of Japanese learners of English affected by instructional treatments that differ in the extent to which they emphasize identifiability (the TR treatment) and accessibility (the MS treatment) to explain the meaning of the article *the*?
2. Do the instructional treatments (TR and MS) yield different outcomes with respect to the four usages of *the*?

The answers to these questions were sought in the context of an intervention study with Japanese learners of English, because of the attested difficulty they experience in learning articles in English (Bickerton, 1981; Butler, 2002; Thomas, 1989; Thompson, 1987). The Japanese language does not have an equivalent morphological counterpart to the English article system and this may account for both the attested difficulty and the lack of importance associated with articles in the context of English as a foreign language (EFL) in Japan. Because the language of instruction used to teach English in Japan is often Japanese, 'the' is frequently translated as 'sono', which means 'that', and 'a' as 'hitotsuno', which means 'one' (Kuno & Takami, 2004). That there are no exact words to describe or to translate the various usages of *the* makes the learning task for Japanese learners of English a challenging one – especially in contexts of grammar-translation where word-to-word translation may limit the range of interpretations available for a single grammatical word.

III Method

1 Participants

In total, 83 Japanese learners of English (63 female and 20 male) with an average age of 27.6 years were recruited to participate in this study. Most participants were holders of temporary work/holiday permits issued by the Canadian government and were attending private English classes in Canada at the time of the study. The first 41 participants were assigned to the MS treatment and the next 42 followed the TR treatment.

Table 1. Group means and standard deviations of English proficiency measures.

Group	Grammar (40 items)		Vocabulary (40 items)		Cloze (60 items)	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
MS	69.32%	13.35	62.11%	13.57	57.71%	14.83
TR	70.33%	16.84	64.95%	14.30	61.59%	12.87

MS: mental space; TR: traditional.

Although the study was conducted in a context where English is used as an L2, the participants may be considered learners of English as a foreign language because they were Japanese nationals staying only temporarily in Canada and whose formal exposure to English had for the most part occurred in the Japanese school system, which begins in junior high school (7th grade). Most participants were graduates of Japanese universities or junior colleges and their mean length of stay in an English-speaking country (including Canada) was 11.7 months at the time of the study. Their level of English proficiency ranged from low-intermediate to low-advanced according to the level determined by the respective educational institutions. To assess their level of proficiency for the purposes of the present study, we administered three proficiency measures: a 40-item grammar test and a 40-item vocabulary test, both adapted from Barron's Michigan Test Battery (Sharp, 1982) and a 60-item cloze test comprising 50 items from Oller, Hudson, and Liu (1977) and 10 items from Lightbown and Halter (1989). The means and standard deviations yielded by each treatment group appear in Table 1. A one-way ANOVA revealed no significant differences between groups on these proficiency measures: grammar, $F(1, 81) = .093$, $p = .76$; vocabulary, $F(1, 81) = .862$, $p = .36$; cloze test, $F(1, 81) = 1.623$, $p = .21$.

2 Procedures

The study was conducted over a 10-month period to allow the 83 participants to individually complete one of two CALL treatments in a quasi-experimental laboratory setting. The TR and MS instructional treatments, both organized as a series of individualized computerized lessons, were designed to be parallel treatments with respect to length, distribution of relevant content, and mode of presentation. One participant at a time came to the lab on six separate occasions (i.e. three testing and three treatment sessions) and, in the presence of the first author, completed a sequence of three consecutive lessons (CALL Lessons 1, 2, and 3) with a 1–2 day interval between lessons. Each lesson lasted 1.5–2 hours on a given day. Pre-tests were administered within a day or two prior to Lesson 1, immediate post-tests were administered on average two days following the last lesson and delayed post-tests were administered two weeks later. The sequence of the six sessions was as follows: English proficiency tests and article pre-test → Lesson 1 → Lesson 2 → Lesson 3 → article post-test → article delayed post-test. On average, a participant spent approximately 5–6 hours for all three lessons. For their time, participants were each remunerated CAD$40.

3 Article test

Two comparable forms (A and B with no repetition of test items) of an article test were administered at Times 1, 2, and 3 (one group following ABA order and the other following BAB) in order to avoid test–retest effects. The test was compiled by extracting article examples from previously published materials (Lyons, 1999; Murphy, 1989; Raimes, 1990; Thomson & Martinet, 1985; Yule, 1998) and by creating additional similar items. In the process, several native-speaker teachers of English L2 were consulted to determine correct answers for scoring purposes. Items that did not elicit a high level of agreement were eliminated. The final versions included 101 items on Form A and 102 items on Form B (detailed item distributions are reported below). Two slightly different formats requiring the insertion of one or more of three article forms (*a, the, 0*) in individual sentences were used in equal proportions. One type entailed a *fill-in-the-blank* format (e.g. At the dinner table: 'Pass me [ ] salt, please') and other type entailed an *insert-where-missing* format (e.g. In a building: 'Where is bathroom, please?').

Form A included 19 distractors and the following distribution of items: Type 1 (n = 17), Type 2 (n = 15), Type 3 (n = 12), Type 4 (n = 38). Form B had 17 distractors and the following distribution of items: Type 1 (n = 12), Type 2 (n = 17), Type 3 (n = 21), Type 4 (n = 35). The inclusion of a greater number of items to test Type 4 articles on both forms was deemed necessary given their greater complexity. Given the slightly different number of items on each form and for each article type, test scores were converted to percentages and are reported as such throughout. Both test versions were found to be highly reliable: Cronbach's alphas were .874 for the 82 items on Form A (without distractors) and .892 for the 85 items on Form B (without distractors). Forms A and B were combined as one test in the analyses after a one-way ANOVA conducted on pre-test scores revealed no significant differences between Forms A and B, $F(1, 81) = 1.337$, $p = .25$.

4 Instructional treatments

The CALL treatments were first created as Word files, and later converted into Java files with a view to making the lessons more interactive, animated, and autonomous. Prior to implementation, three native speakers of English (teachers of English L2) and two native speakers of Japanese (teachers of Japanese as a foreign language) evaluated the instructional materials for comparability, appropriateness, and overall organization.

When participants first logged into the instructional treatment, an embedded video of the teacher, a native speaker of English, appeared on the screen, welcoming them and introducing herself. She then instructed participants to read all the written prompts appearing on the screen throughout the treatment and also gave a brief outline of how to proceed, including technical information such as when to click to listen to her spoken messages or to record an answer. During the lesson, if a step (or an answer) was inadvertently skipped, then a reminder window appeared that prompted participants to redo the part they missed. In the context of various exercises and games, when participants clicked on an answer, the instructor's immediate response (spoken or written) appeared in order to indicate right or wrong answers on the spot.

Both CALL treatments were designed as a series of self-regulated classroom lessons with teacher–learner interaction, so that participants could individually attend to the content of the lessons on the computer screen. Participants could take as much time as they required on one screen before moving on to the next. Most participants spent from 1.5–2 hours per lesson. In total, each participant read 120 screens (spending 5–6 hours) to cover all three lessons.

The focus of instruction was mainly on explanations of the concepts and rules that each theoretical orientation represents. Both CALL interventions, therefore, entailed 'explanations of form and use' and are thus illustrative of explicit grammar instruction (Ur, 2011, p. 510) as opposed to focus-on-form instruction, which 'is supposed to draw learners' attention to form as they are experiencing a communicative need' (Loewen, 2011, p. 582).

a TR treatment. To develop the TR instructional materials, various well-known published materials were drawn upon (Hawkins, 1978; Lyons, 1999; Murphy, 1989; Quirk & Greenbaum, 1973; Raimes, 1990; Swan, 1980; Thomson & Martinet, 1985) to explain typical TR concepts such as identifiability, definiteness, specificity, and familiarity. Definite articles were viewed through two perspectives: *identifiability* and *a/the* distinctions (indefinite/definite). The TR participants were first made aware that '*the* is there to identify the referent' and then led to analyse its semantic category by determining whether *the* + *noun* was specific, familiar, or unique, definitions of which were provided based on Hawkins (1978) and Raimes (1990). These definitions were shown repeatedly, each time with a different mode of presentation throughout the lessons. Paired sentences using the same NP but describing different contexts of situation were also shown for participants to observe the difference in usages:

1. *The telephone over there is out of order. You can't use it!*
2. *The telephone is so useful. It is still indispensable.*

Participants were instructed to read the examples, sometimes quietly and sometimes aloud into the microphone, and then led to assess whether or not *the telephone* in (1) and (2) above was the same and identifiable. In order to establish identifiability in the sense of pinpointing the NP, questions such as '*Can you tell which telephone is being talked about?*' appeared on the screen. What makes an object identifiable, familiar, and unique was explained, and explanations for *a/the* distinctions were provided.

b MS treatment. The pedagogical principle governing the MS framework was that the usages of *the* are seen through schemata, so the example sentences served as event frames (a mental space configuration) and the learner was asked to visualize the object in the context, also in three ways: (a) the object is visible in the situation; (b) the object is visible in the mind; or (c) objects are in a membership relation. In the process of creating the MS treatment, efforts were made to operationalize the construct of accessibility as a teachable notion. The theoretical underpinnings of cognitive meaning interpretations were conveyed in ways that showed the learner how to capture the cognitive structure depicted by the sentence. In other words, participants were instructed to create a

discourse world (i.e. an event frame) in which they capture (a) the sentence as a situation, (b) the NP (*the* + *noun*) as an object (or thing), and (c) the movement (behaviour or motion) as an abstract notion evoking an image schema. They were first instructed to become the speaker within the schema by conceptually entering the scene and viewing the intended object to determine whether it was visible in the situation, visible in the mind, or associated with other entities through membership relations.

To illustrate the distinction between visible and not visible in the mind, the same pair of sentences that was used for the TR group was used for the MS group as well:

1. *The telephone over there is out of order. You can't use it!*
2. *The telephone is so useful. It is still indispensable.*

The telephone in (1) is designated as an object visible in the situation and in (2) as an object visible in the mind. In order to contextualize the situation, a statement reminding the learner that '*you are the speaker in this situation*' appeared on the screen several times. Questions such as '*Where are you in relation to the telephone?*' were also asked and through questions such *as* '*Can you show the telephone to the hearer by pointing to it?*' participants were prompted to take the role of speaker and to imagine interacting with other interlocutors

Terms such as 'inclusiveness' or 'conceptual connection' are highly sophisticated for learners to use, so the term 'membership' was used instead. Statements such as '*a house* triggers *front door, kitchen*, and *bathroom*' were explained using many membership examples (e.g. *book* → *bookshelf, building* → *elevator*). In addition, false membership (i.e. mentioning *taxi* does not trigger *kitchen* in our mind) was also explained to consolidate the idea of membership. In addition, games were played in which participants had to select membership items (*taxi* → *rear-view mirror*) from a list appearing on the screen.

c Similarities and differences across treatments. The comparability of the MS and TR treatments was given much consideration at the level of both instructional design and theory. In terms of instructional design, the lesson formats of the two treatments were operationalized in a parallel manner. In terms of the theoretical notions, there was some overlap and also, of course, some key differences. With respect to similarities, the TR concept of specificity (*the object is there*) closely resembles the MS counterpart of *the object is visible in the situation*, and the TR concept of familiarity (or shared knowledge) resembles the MS counterpart of *the object is visible in the mind*. In terms of differences, while the TR concept of uniqueness parallels the base concept of identifiability, the MS concept of membership parallels the base concept of accessibility. The pivotal difference across the two treatments, therefore, lay in the inclusion of the membership concept in the MS treatment and its exclusion in the TR treatment, and the explicit explanation of (in)definiteness in the TR treatment (when to use *a/the*) and its exclusion in the MS treatment.

IV Results

The main independent variables in this three-factor quasi-experimental laboratory study were Time, Group, and Article Types. The effects of each independent variable on

Table 2. Group means and standard deviations of overall test scores across time.

Group	*n*	Time 1		Time 2		Time 3	
		Mean	*SD*	Mean	*SD*	Mean	*SD*
MS	41	68.16%	9.70	85.42%	4.83	85.67%	4.22
TR	42	69.80%	11.89	82.17%	7.51	78.68%	15.19
Total	83	68.99%	10.84	83.77%	6.50	82.13%	11.68

MS: mental space; TR: traditional.

Table 3. Group means and standard deviations for article types across time.

Type	Group	Time 1		Time 2		Time 3	
		Mean	*SD*	Mean	*SD*	Mean	*SD*
1	MS	87.79%	15.73	99.19%	3.12	97.96%	3.36
	TR	86.05%	17.98	95.97%	5.39	94.71%	16.04
2	MS	69.88%	15.29	90.69%	9.26	92.03%	7.24
	TR	71.52%	15.32	86.82%	10.05	83.14%	18.51
3	MS	61.18%	16.69	85.71%	10.72	87.63%	9.77
	TR	65.50%	16.23	78.88%	11.64	73.55%	20.69
4	MS	54.07%	17.55	86.23%	6.17	85.04%	7.51
	TR	56.11%	18.56	75.17%	14.48	71.66%	20.49

MS: mental space; TR: traditional.

learners' scores were examined first with a repeated-measures ANOVA, conducted using the mixed model procedure (PROC MIXED) of SAS, version 9.1. Post-hoc pairwise comparison analyses (differences in least square means) were also conducted to determine the significant contrasts within each main effect. The alpha level reported for the main effects, interaction effects, and pairwise comparisons was set at .05. Effect sizes were computed for significant mean differences using Cohen's *d* procedure.

The group means and standard deviations obtained by each group on overall scores across the three testing times appear in Table 2. Results from the mixed-design ANOVA confirmed that there was a significant Time effect, $F(2, 80) = 152.08$, $p < .001$. Post-hoc analyses confirmed a significant increase between Times 1 and 2 ($p < .001$, $d = 1.65$) and between Times 1 and 3 ($p < .001$, $d = 1.17$), but no significant change between Times 2 and 3 ($p = .794$).

There was no significant main effect for Group, because the post-instruction scores on all article types increased significantly for both groups. However, there was a significant Time × Group interaction effect: $F(2, 80) = 7.23$, $p < .001$. Post-hoc comparisons were conducted to identify between-group differences at each testing time. At Time 1, there were no significant differences between the groups ($p = .494$), but the MS group outperformed the TR group both at Time 2 ($p = .022$, $d = .51$) and at Time 3 ($p = .002$, $d = .63$).

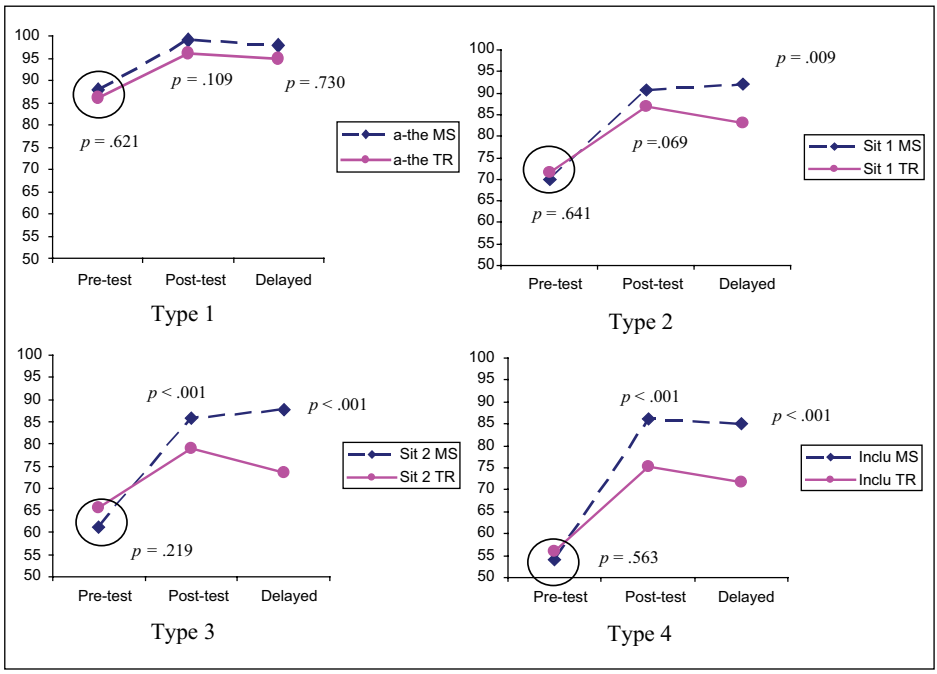

Figure 1. Group means across time for article types.
MS: mental space; TR: traditional; a-the: '*a*' becomes '*the*'; Sit 1: visible in the situation; Sit 2: visible in the mind; Inclu: inclusive/associative.

Table 3 displays the group means and standard deviations obtained for each article type by both groups across the three testing times, while Figure 1 visually displays the performance of both groups over time for each article type. The mixed-design ANOVAs revealed a significant main effect for Article Type, F (3, 247) = 137.43, $p < .001$, and a significant Group effect, F (1, 190) = 9.20, $p < .003$. Also obtained were significant interaction effects for Group × Time, F (2, 139) = 7.95, $p < .001$; Time × Article Type, F (6, 396) = 9.05, $p < .001$; and Group × Time × Article Type, F (6, 396) = 4.16, $p < .001$. These results confirmed that the treatments led to differential effects across all article types.

At Time 1, all learners performed better with Type 1 than with Type 2 articles ($p < .001$), better with Type 2 than with Type 3 articles ($p < .001$), and better with Type 3 than with Type 4 articles ($p < .001$). At Time 2, however, significant differences distinguished the groups within the two most complex article types (Types 3 and 4), with pairwise comparisons within the significant interaction effect for Group × Time × Type yielding the following results. Whereas the order remained the same for the TR group, Type 1 > Type 2 ($p < .001$, $d = 1.14$), Type 2 > Type 3 ($p < .001$, $d = 0.73$), Type 3 > Type 4 ($p < .026$, $d = 0.28$), the MS group followed the order only up to Type 2: Type 1 > Type 2 ($p < .001$, $d = 1.21$), Type 2 > Type 3 ($p < .003$, $d = 0.49$), and Types 3 and 4 ($p < .760$)

became indistinguishable. At Time 3, the performance of the TR group slightly declined compared with Time 2, whereas that of the MS group remained the same.

Following the within-group comparisons of the four article types, the between-group differences for each Article Type were also analysed. At Time 1, the means of the two groups were not significantly different for any of the article types: Type 1 (p = .621), Type 2 (p = .641), Type 3 (p = .219), and Type 4 (p = .563). At Time 2, whereas the group means were not significantly different within Type 1 (p = .109) and Type 2 (p =. 069), the MS group performed significantly better than the TR group within the two most complex article types: Type 3 (p < .001, d = .61) and Type 4 (p < .001, d = .98). Further, at Time 3, the differential effects of the MS treatment became more distinct, as the between-group difference for Type 2 articles also became significant (p = .009, d = .63) and the MS learners continued to outperform their TR counterparts for Types 3 (p < .001, d = .87) and 4 (p < .001, d = .87), leaving the only non-significant difference between-group contrast for the least complex of the article types: Type 1 (p = .730).

V Discussion

The present study investigated the effects of two instructional approaches that varied in the extent to which they emphasized identifiability or accessibility to explain the meaning of the definite article *the*. Concerning overall article test performance, both groups performed similarly at Time 1. Within-group comparisons revealed that they both exhibited significant increases at Time 2, which were maintained at Time 3, while the between-group comparisons showed that the MS group significantly outperformed the TR group at both Times 2 and 3. Concerning test scores on specific article usages, the within-group comparisons again revealed significant increases on all article types for both groups, whereas the between-group comparisons showed that the MS group significantly outperformed the TR group on Type 2 articles at Time 3 and on Types 3 and 4 at both Times 2 and 3. Thus, the different treatments had differential effects depending on the article types, with the MS group performing especially well on the most difficult conceptual usages (i.e. Types 3 and 4).

That the MS group significantly outperformed the TR group on the conceptual usages of *the* is not surprising given the schema-based nature of the MS treatment, which included conceptual connections that enabled learners to see the conceptual aspects of *the* more than could the TR treatment, which instead emphasized explanations of *the* in terms of identifiability, familiarity, and uniqueness. Moreover, the MS treatment made use of bodily driven concepts through which participants were able to engage themselves (as speakers) in a given situation. A case in point is the type of questions asked, such as 'From where you are, can you see the telephone?' or 'Can you show the telephone to the listener by pointing to it?' This type of strategy with bodily involvement is an integral part of human cognition and, therefore, is easy to acquire, not easily forgotten, and reusable in different situations.

What may seem more surprising at first glance is the finding that the MS group, even though it received no particular instruction on the structural identifiability explanation (*a cat* → *the cat*), made significant improvement in Type 1 usage over time, matching the performance of the TR group, which had received plenty of explicit explanation focusing

on the definiteness and indefiniteness of *the* and *a*, respectively. This may suggest that, because the MS treatment was designed to explain more conceptual types (Types 3 and 4), participants in the MS group were able to generalize to other less complex types as well. Whereas Types 1 and 4 may have converged into one for the MS group in a way that triggered a generalization process and produced a reinforcement effect, the reverse effect of Type 1 merging into Type 4 did not seem to occur for the TR group. The schematic representation of conceptual connections or mappings within event frames is thus unlikely to obtain solely through structural orientations or identifiability explanations. One simple pedagogical implication to be added here is that if Type 1 (*a tree* → *the tree*) usage is to be taught, it is perhaps better to introduce both Types 1 and Type 4 (*a tree* → *the root* and *the branches*) simultaneously in parallel fashion and to explain to learners the difference between the structural connections in Type 1 and the conceptual connections in Type 4.

In addition to the conceptual overlap in Types 1 and 4, another overlap emerged between Types 3 and 4. Before the treatments began, performance on Types 3 and 4 by both groups was low in relation to their performance on Types 1 and 2, with performance on Type 4 clearly lower than performance on Type 3. After the treatments, the MS group not only exceeded the TR means on both Types 3 and 4, but also its mean scores for Types 3 and 4 became equivalent. To explain why this might have been the case, the examples are reiterated here:

Type 3 [*in a house*] Where is the bathroom, please?
Type 4 I've just been to a wedding. The bride wore blue.

In an actual conversation, a contextual clue such as '*in a house*' is not provided. In the written texts that were visually displayed as part of the CALL lessons, however, an effort was made to specify a context for the utterances being analysed. In this method of presentation, Types 3 and 4 could have been conceptualized in almost the same way: *a house* triggers *the bathroom* and *a house* and *the bathroom* are conceptually in the same membership package. Likewise, *a wedding* and *the bride* are in the same membership package. Thus, learners may have treated these two types in the same way, using both concepts indiscriminately (i.e. 'visible in the mind' and 'membership') in making decisions about Type 3 and Type 4 usages.

VI Conclusion

The view adopted in this study is still in its developmental stages and thus requires further exploration. Because the notion of accessibility, unlike the notion of identifiability, has not yet been pedagogically tested, putting the MS approach to the test was thought to be essential. The results suggest that aspects of the MS treatment (most notably getting learners to create mental images that illustrate relationships among entities) could be effectively integrated into current instructional practices to improve learners' understanding of specific usages of the definite article. This suggestion is based on the finding that, whereas both groups exhibited significant increases at Time 2 and maintained them at Time 3, the MS group significantly outperformed the TR group at both Times 2 and 3

in the between-group comparisons. Moreover, the different treatments had differential effects depending on the article types, as expected, with the MS group performing especially well on the most difficult conceptual usages.

A major limitation of the present study is the absence of any oral production measures. Improvements were measured only by means of paper-and-pencil tasks and thus reflect degrees of awareness but not actual performance. Moreover, while the effects of instruction on awareness were clearly shown for the Japanese participants, a question worthy of further pursuit is whether results would be similar with speakers of other languages such as Chinese or Korean. Future investigations are needed to test the effects of instruction with variable emphases on identifiability and accessibility with other groups of learners confronted with the challenging task of learning definite article usages in English.

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