an adventure in ambiguity with *one fish two fish*

*one fish two fish*: thus begins the title of a famous Dr. Seuss children’s book, which continues *red fish blue fish*, a title familiar to millions. In a 2001 *Publisher’s Weekly* list of books that have sold more than a million copies, the book was listed at #13 with 6,314,391;¹ and six years later, it ranked in the National Education Association online survey for Teachers’ Top 100 Books for Children at #80.² So the chances are that you recognize the title because you have read the book as a child, or have had the book read to you before you could read, or have read the book to a child. But you may not remember how many fish the title describes.

On the left side of the cover Dr. Seuss draws 5 fish: one white fish on the top, two green fish under it, one red fish under them, and one blue fish under the red fish. On the right side of the cover, we read the 2 words that describe each of these drawings. These words and drawings are repeated on the first page of the book but with the words appearing down the middle of the page and the words in front of the drawings (except for the drawing of two fish). On the first page the first three fish change color to yellow, the first yellow fish with red fins and tail. Furthermore, on the first page Dr. Seuss punctuates the title as a sentence by capitalizing *one* as *One* and putting a period after *blue fish*. With the illustrations, it is easy to take for granted how the interpretation of the words in the title works.

Consider the title as it appears on the first page, where the color of the words matches the color of objects they describe.

(a) **One fish two fish red fish blue fish.**

This title consists of eight words: the noun *fish* repeated 4 times, the numbers *one* and *two*, and the colors *red* and *blue*, where each noun is modified by a number or a color. The noun together with its modifier constitutes a syntactic unit, as illustrated in (b), which brackets the 4 units.

¹ vol. 248, issue 51, December 17.
² www.nea.org/grants/teachers-top-100-books-for-children.html
The number *One* indicates a single fish, while *two* indicates multiple fish – in this case, exactly 2. Thus the noun *fish* in the first syntactic unit is interpreted as singular, while in the second unit, *fish*, having the same pronunciation (in linguistics, phonetic form) and spelling, is interpreted as plural. Given Dr. Seuss’s drawing of one red and one blue fish, the two instances of *fish* in the 3rd and 4th syntactic units are also interpreted as singular. We can distinguish the singular/plural distinction graphically by representing the plural in boldface, as shown in (c).

Furthermore, each syntactic unit describes different fish.

Untethering the title from its illustration opens the gateway to other interpretations, revealing something of the magic of language.

### 1.1 How an 8-word title can have many interpretations

Consider first the possible interpretations for just *red fish blue fish*. Because the noun *fish* in the English lexicon (roughly, the collection of words used in a language) can be interpreted as either singular or plural, this part of the title can represent 4 distinct interpretations, as illustrated graphically in (d), where the plural interpretation of *fish* is indicated with boldface.

Without a drawing to illustrate which interpretation is intended, all 4 interpretations are equally possible.

In contrast, the first part of the title, *one fish two fish*, might at first glance appear to have only one interpretation, where the two syntactic units designate distinct sets of fish. Thus *one* plus *two* equals 3 fish. However, there is another possible interpretation of *two fish* where this includes the *one fish*. Imagine that Dr. Seuss had drawn a name tag *Mary* on the first fish, and then drawn *Mary* again with another fish *Harry* to represent *two fish*. Under this representation, *one fish two fish* would represent only 2 fish, *Mary* and *Harry*. The same situation can happen without name tags, when for example someone pointing at a single fish in a tank says *one fish* and then pointing to a second fish and

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2 an adventure in ambiguity with *one fish two fish*

(b)  

<table>
<thead>
<tr>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
</tr>
</thead>
<tbody>
<tr>
<td>One fish</td>
<td>two fish</td>
<td>red fish</td>
<td>blue fish</td>
</tr>
</tbody>
</table>

(d)  

1. [ red fish ] [ blue fish ]
2. [ red fish ] [ blue fish ]
3. [ red fish ] [ blue fish ]
4. [ red fish ] [ blue fish ]

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1.1 How an 8-word title can have many interpretations

says *two fish*, including the first. So the interpretation of these two syntactic units can be either distinct or inclusive, which is another source of ambiguity with this title.

Putting the two parts of the title back together allows for a further compounding of the ambiguities inherent in each part. Let’s suppose that all the fish described are either red or blue, in which case the title could be rendered as either (e) or (f), where only the *fish* modified by *two* is interpreted as plural and the other instances of *fish* are singular.

(e) [ One fish ][ two fish ][ red fish ][ blue fish ]
(f) [ One fish ][ two fish ][ red fish ][ blue fish ]

If the 4 syntactic units in these representations of the title are interpreted as distinct, this yields 5 fish: \(1 + 2 + 1 + 1\) (2 red fish + 3 blue fish) in (e) and \(1 + 2 + 1 + 1\) (3 red fish + 2 blue fish) in (f).

Alternatively, the unit blue fish in (e) could be interpreted as describing *two fish* and the unit red fish could be describing *one fish*. Under this interpretation (*two blue fish* and *one red fish*), there are only 3 fish – and the representation in (e) would actually be (g), where the syntactic unit blue fish contains the plural, and to show the identities between *one fish* and red fish and between *two fish* and blue fish, the corresponding syntactic units carry identical subscripts \(a\) and \(b\).

(g) [ One fish ]\(_a\) [ two fish ]\(_b\) [ red fish ]\(_a\) [ blue fish ]\(_b\)

Thus \(1 + 2 = 3\) fish. And similarly for *two red fish* and *one blue fish* in (f), yielding \(2 + 1 = 3\) fish.

In between the 5-fish and 3-fish interpretations lurk several 4-fish interpretations. These interpretations can be derived in more than one way. For one, the interpretation represented in (g) can be modified as (h), where *one fish* and *red fish* are 2 separate fish and thus these syntactic units do not bear an identical subscript.

(h) [ One fish ] [ two fish ]\(_b\) [ red fish ] [ blue fish ]\(_b\)

(h) represents one 4-fish interpretation: 2 red fish and 2 blue fish \((1 + 2 + 1)\). The same unlinking strategy applies to *two fish* and *blue fish* in (g), yielding (i).

(i) [ One fish ]\(_a\) [ two fish ] [ red fish ] [ blue fish ]

(i) represents a different situation where there is only 1 red fish and 3 blue fish \((1 + 2 + 1)\). Two additional 4-fish interpretations result from flipping the colors of *one fish* and *two fish* in (h) and (i), yielding (j.1) and (j.2) where there are again 2 blue fish and 2 red fish \((1 + 2 + 1)\), but in a different configuration.
4 an adventure in ambiguity with *one fish* *two fish*

(j) 1. [One fish] [two fish] [red fish] [blue fish]
2. [One fish] [two fish] [red fish] [blue fish]

(j.1) represents the interpretation of two red fish and two blue fish \((1 + 2 + 1)\), whereas (j.2) yields one blue fish and three red fish \((1 + 2 + 1)\). In each of these interpretations one pair of syntactic units describe the same fish (plural in (j.1), singular in (j.2)), while the other two units describe different fish. However, it probably seems more natural to understand the four syntactic units as either paired or distinct.

The other way to understand the Dr. Seuss title as 4-fish is to apply the inclusive interpretation to *two fish* as discussed above, where *two fish* includes the *one fish*, and both red fish and blue fish designate two other fish. Under this interpretation 4 fish can be matched to the 4 syntactic units as follows, where R designates the color red, and B the color blue:

(k) syntactic units: 1 2 3 4  
fish: \(R_a (R_a + B)\) \(R_a B\)

The subscript \(a\) on the first fish functions essentially like a name tag. Without the identical subscript, \(R\) and \(R_a\) designate different fish, as do the two instances of \(B\) in (k). (k) represents two red fish and two blue fish. Because the color of the first two fish in *one fish*, *two fish* is open to interpretation, the colors assigned the first two units could be switched, yielding again two red fish and two blue fish. Moreover, the first two fish could be the same color, either red or blue. If both are blue, then we have 3 blue fish and 1 red fish, but if both are red, then 3 red fish and 1 blue fish. And as we know from the Dr. Seuss illustrations, the fish described by *one fish two fish* could be colors other than red or blue.

The inclusive interpretation of *one fish two fish* also provides another way to calculate 3-fish with the title. Just assume red fish describes the *one fish*. This produces a modification of (k) as (l), where the representation of the third syntactic unit bears the same subscript as the first:

(l) syntactic units: 1 2 3 4  
fish: \(R_a (R_a + B)\) \(R_a B\)

Now there is only 1 red fish along with 2 blue fish \((1 + 1 + 1 = 3)\).

And from (l) it is simple to find the 2-fish interpretation, simply by interpreting blue fish as a description of the second fish in *two fish* – yielding (m):

(m) syntactic units: 1 2 3 4  
fish: \(R_a (R_a + B_b)\) \(R_a B_b\)

Which illustrates how Dr. Seuss could have illustrated his cover with just his single red fish and single blue fish.

If 2 is the smallest number of fish that the title can describe, what is the largest number – that is, can we get beyond the 5-fish representations? To see
1.2 Syntax and punctuation

how this is done, reconsider one of the 5-fish representations (repeated below), where all 4 syntactic units represent different fish.

(e)  
[ One fish ] [ two fish ] [ red fish ] [ blue fish ]

Fish in both red fish and blue fish is, under this interpretation, singular. If instead, one of these fish is interpreted as plural, yielding either (n) or (o), then the title would be understood as at least one additional fish.

(n)  
[ One fish ] [ two fish ] [ red fish ] [ blue fish ]

(o)  
[ One fish ] [ two fish ] [ red fish ] [ blue fish ]

(n) represents the situation where there are at least 3 red fish and 3 blue fish (1 + 2 + 3 = 6), while (o) represents 2 red fish and at least 4 blue fish (1 + 2 + 1 + 2 = 6). And if fish in both red fish and blue fish is plural, as in (p), then the title would represent at least 7 fish.

(p)  
[ One fish ] [ two fish ] [ red fish ] [ blue fish ]

So just in terms of how many fish the title could represent, these 8 words are 6-ways ambiguous – putting aside the assignment of other colors to one fish two fish.

1.2 Syntax and punctuation

Given the multiple interpretations for this title, we might wonder whether adding some internal punctuation could uniquely identify one or more of them, as happens in title of Lynne Truss’s well known 2003 book on punctuation: Eats, Shoots & Leaves: The Zero Tolerance Approach to Punctuation. The main title, the back cover of the paperback edition tells us, concerns a panda with a sense of humor who reads English. Having read eats, shoots and leaves as part of a description of pandas in a wildlife manual, the panda enters a cafe, orders and consumes a sandwich, fires a gun in the air and then heads for the door. When confronted by a confused waiter, the panda tosses a badly punctuated wildlife manual over his shoulder, telling the waiter to look up the entry for panda.3

As a description of pandas, the comma after eats is a mistake if the writer intended to say that the diet of pandas consists of shoots and leaves – in which case, shoots and leaves are both nouns. With the comma, both shoots and leaves can only be interpreted as verbs describing actions, because a comma

3 Different versions of this panda joke with the same punch line occur in Ursula Le Guin’s 1998 book on story writing, Steering the Craft (p. 35), and also in volume 111 of The Illustrated Weekly of India (September 30, 1990). Le Guin’s discussion occurs at the end of a chapter titled Punctuation, and although she tells the panda story to illustrate the importance of the presence or the absence of the comma, she does not put a comma after eats as Truss does.
can never be used to separate a verb (eats) from the noun that functions as its object (shoots) – for example, #reads, novels (where # marks what is impossible in written English). Given that both shoots and leaves can be interpreted as either nouns or verbs, the 4 words of the punch line to the panda joke could be legitimately interpreted in three different ways and illegitimately in a fourth, as shown in (q), where * marks an impossible interpretation.

(q)  
<table>
<thead>
<tr>
<th></th>
<th>Eats</th>
<th>shoots and leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V</td>
<td>N &amp; N</td>
</tr>
<tr>
<td>2</td>
<td>V</td>
<td>V &amp; V</td>
</tr>
<tr>
<td>3</td>
<td>V</td>
<td>N &amp; V</td>
</tr>
<tr>
<td>4</td>
<td>*V</td>
<td>V &amp; N</td>
</tr>
</tbody>
</table>

In (q.1) the two nouns are joined together by the conjunction and to form a syntactic unit, a coordinate structure in which each noun constitutes one conjunct, where this unit is interpreted as the object of the verb eats. In (q.2), while the conjunction overtly connects the last two verbs, all three verbs are on a par, so that the title could be rewritten by replacing the comma with another and, yielding Eats and shoots and leaves with no ambiguity. In this way, (q.2) constitutes a coordinate structure with three conjuncts, each one a verb – the panda’s interpretation. With (q.3), the verb eats forms a syntactic unit with its object, the noun shoots. This syntactic unit (traditionally called a predicate) constitutes the left-hand conjunct of a coordinate structure containing the single verb leaves as the right-hand conjunct. The single verb leaves also functions as a predicate, so in (q.3) and coordinates two predicates. In contrast, (q.1) constitutes a single predicate.

This contrast can be represented graphically by bracketing the syntactic units in (q.1) and (q.3) as illustrated in (r).

(r)  
<table>
<thead>
<tr>
<th></th>
<th>Eats</th>
<th>shoots and leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[ V</td>
<td>[ N &amp; N ] ]</td>
</tr>
<tr>
<td>2</td>
<td>[ V</td>
<td>N ] &amp; V ]</td>
</tr>
</tbody>
</table>

In (r.1 (= q.1)), the coordinate structure that conjoins two nouns constitutes a subpart of the predicate, whereas in (r.2 (= q.3)) the predicate consisting of the first verb and the only noun constitutes a conjunct in the larger coordinate structure. As for the impossibility of (q.4), this follows from the fact that conjuncts in a coordinate structure must be the same type: for example, both nouns as in (r.1) or both predicates as in (r.2); but a noun can never form a coordinate structure with a verb as would have to be the case with (q.4).

Truss’s title illustrates how the placement of a comma after eats forces the interpretation of shoots as a verb, thereby arriving at a unique interpretation out of 4 possible interpretations of the 4 words it contains. This raises the question of whether the other two legitimate interpretations represented in (r) can be
1.2 Syntax and punctuation

distinguished in terms of internal punctuation. In (r.1) where *shoots and leaves* is a coordination of nouns, no internal punctuation is possible. But in (r.2) where *and* coordinates two predicates (*eats shoots and leaves*) some punctuation mark between the first predicate and *and* might be plausible. Consider the choices in (s).

(s)

1. *Eats shoots, and leaves*
2. *Eats shoots; and leaves*
3. *Eats shoots: and leaves*
4. *Eats shoots – and leaves*

Grammatically, the comma in (s.1) makes as much sense as in the coordination of *these bankers* and *those politicians* punctuated as *these bankers, and those politicians* (or in a coordination of two verbs as in *eats, and departs* – that is, no sense at all. Whether the semicolon in (s.2) or the colon in (s.3) make more sense, depends what we understand these two punctuation marks to indicate. Lynne Truss’s engaging chapter about them surveys a wide range of opinion on their use and abuse. Regarding the colon, she endorses Henry Fowler’s colorful description of its function: *that of delivering the goods that have been invoiced in the preceding words; it is a substitute for such verbal harbingers as viz., scil., that is to say, i.e., etc.* And therefore, (s.3) fails to express the intended reading (r.2), where *shoots* is a noun and *leaves* is a verb.

The function of the semicolon, in contrast to the colon, is similar to that of the comma in some coordinate structures. Truss’s title coordinates three verbs, an interpretation which could have been expressed by substituting another *and* for the comma, yielding *Eats and shoots and leaves* and showing how some commas stand in for the conjunction *and*. But when the conjuncts in such coordinate structures themselves contain commas – as in *Bloomington, Indiana and Cambridge, Massachusetts and Princeton, New Jersey* – replacing the first *and* with a comma risks confusing the new comma, which is interpreted as ‘*and*’, with the ones that come before and after, which clearly do not mean ‘*and*’. A general strategy of punctuation is to use the semicolon instead of the comma in such cases; *Bloomington, Indiana; Cambridge, Massachusetts and Princeton, New Jersey* – a strategy that generalizes to other instances where conjuncts contain commas. Furthermore, when two sentences are joined together with *and* where the two sentential conjuncts are complex and contain commas, the first conjunct is punctuated with a semicolon to indicate the point of separation between the two sentences. Consider for example, George Orwell’s discussion of *operators or false verbal limbs* in “Politics and the English Language,” which begins with a complaint: *These save the trouble of*

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4 A *Dictionary of Modern English Usage* (Oxford, 1926), p. 569. *viz* stands for the Latin *videlicet*, meaning literally ‘one may see’; *scil* for the Latin *scilicet*, meaning literally ‘one may know’. *i.e.* is an abbreviation for the Latin *id est*, meaning ‘in other words’.
picking out appropriate verbs and nouns, and at the same time pad each sentence with extra syllables which give it an appearance of symmetry; and ends with the following compound sentence, where the conjunction (in boldface) joins two sentences that could otherwise stand alone:

Simple conjunctions and prepositions are replaced by such phrases as *with respect to*, *having regard to*, *the fact that*, *by dint of*, *in view of*, *in the interests of*, *on the hypothesis that*; and the ends of sentences are saved by anticlimax by such resounding commonplaces as *greatly to be desired*, *cannot be left out of account*, *a development to be expected in the near future*, *deserving of serious consideration*, *brought to a satisfactory conclusion*, and so on and so forth.

Because the two sentential conjuncts conjoined by *and* contain commas, the semicolon is used before the *and* to mark the boundary of the first conjunct in a way that distinguishes it from boundaries established by the commas inside it. Otherwise, a comma in this position could easily be lost among the other commas in the sentence. The same use of the semicolon also occurs in the sentence above that precedes the example from Orwell.

In addition, the semicolon can be used to link two independent but related sentences in the absence of a conjunction, as illustrated in the following sentences from the first page of Noam Chomsky’s *Language and Thought* (Moyer Bell, 1993).

> When I was a graduate student forty years ago, it took no great effort to master the theoretical content of linguistics and psychology; what was then at all understood occupies very little of today’s curricula.

> Specialization is no proof of progress; it has often meant displacement of penetrating insights in favor of technical manipulation of little interest.

But neither of these functions justify the use of the semicolon between *shoots* and *leaves* in Truss’s title (s.2). Which leaves the dash in (s.4) as the only plausible way to punctuate this 4-word sentence to render unambiguously the interpretation (r.2), where *shoots* is a noun and *leaves* is a verb.

Returning to the 4 syntactic units in the Dr. Seuss title, under the interpretation where each unit designates a distinct group of fish, the 4 units function as 4 conjuncts in a coordinate structure. This interpretation could be represented unambiguously by making this explicit: inserting *ands* between the 4 units, as in (t).

(t)  

> One fish and two fish and red fish and blue fish.

However, (t) no longer describes Dr. Seuss’s illustration of 5 fish because *fish* in *red fish* and in *blue fish* would most plausibly be interpreted as plural, yielding the at-least-7-fish interpretation. To match the Dr. Seuss illustration,
the coordinate structure would have to read *One fish and two fish and a red fish and a blue fish*.

The unambiguous interpretation of the coordinate structure of (t) can also be achieved with punctuation by replacing the first two *ands* with commas, as in (u), or all three *ands* with commas, as in (v).

(u) *One fish, two fish, red fish and blue fish.*

(v) *One fish, two fish, red fish, blue fish.*

In (t) and (u) the compact rhythm of Dr. Seuss’s title is lost; but reappears in (v), which constitutes an *asyndetic* coordination, a coordinate structure without any coordinating conjunctions. Truss’s title could also be expressed unambiguously as an asyndetic coordination: *Eats, shoots, leaves.*

Asyndetic coordinate structures are primarily stylistic devices in writing; and it’s doubtful that they occur in casual speech (or casual writing such as texting). Consider the following four examples highlighted in boldface in (w).

(w) 1. *Although the Inventors [of the United States] were hostile to the idea of democracy and believed profoundly in the sacredness of property and the necessary dignity of those who owned it, they did not like the idea of king, duke, marquess, earl.*

2. *Look for independent sources of information beyond official pronouncements, the mass media, the formal educational system.*

3. *It’s satisfying to see that sentences shrink, snap into place, and ultimately emerge in a more polished form: clear, economical, sharp.*

4. *Wee, sleeket, cowran, tim’rous beastie*

The coordinate structure highlighted in (w.1) coordinates 4 nouns; and functions as the object of the preposition *of*. (w.1) tells us that the founders of the United States did not like the idea of any of these titles equally. The coordinate structure highlighted in (w.2) coordinates 3 syntactic units that are larger than single nouns. This syntactic unit functions as the object of the preposition *beyond*. (w.2) advises us to look beyond the sources of information highlighted in (w.2), which, it is implied, are not the whole story. (w.3) illustrates an asyndetic coordination of adjectives defining *a more polished form* (recall Fowler’s characterization of the function of the colon). In (w.1), (w.2), and (w.3) these asyndetic coordinate structures come at the end of the sentence, giving the sentence a bit more tang than the usual syndetic coordinate structure

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where the final conjunct is preceded by the coordinating conjunction and. In contrast, the 4 adjectives highlighted in (w.4) that describe the beastie that is the mouse form a coordinate structure that precedes a noun. Asyndetic coordination of adjectives in front of a noun is perhaps the more usual form – sometimes without commas as in rich invigorating satisfying flavor said of a wine.

There is yet another way of punctuating coordinate structures with more than two conjuncts, where the final conjunct is preceded by a coordinating conjunction and the penultimate conjunct is followed by a comma – called a ‘serial’ comma (or Oxford comma, because the editorial style sheet of Oxford University Press insists on the use of the serial comma). Punctuated with the Oxford comma, Truss’s title would read Eats, Shoots, and Leaves. While mandatory for Oxford, it is not according to Truss. In demonstrating when an Oxford comma is useful, Truss cites one of her own sentences (on p. 7) which credits an unnamed author with the idea that punctuation marks are the traffic signals of language: they tell us to slow down, notice this, take a detour, and stop. She reasons that without the final comma after detour, the coordinate structure might be misread as 3 instructions, the last being a compound of 2, instead of 4 separate instructions. Consider another situation where you and a friend have invited 3 people for dinner: Judy, Fred, Helen. Now compare the situation where these three people are independent and therefore 3 invitations were issued, as opposed to the situation where Fred and Helen are a couple. The former situation would be expressed using the Oxford comma straightforwardly as Judy, Fred, and Helen, while the latter might be rendered as Judy, and Fred and Helen, which applies the Oxford comma to the first conjunct Judy (or alternatively by flipping the two conjuncts as Fred and Helen, and Judy). These are subtle points; ultimately, a matter of personal taste.\(^6\)

\(^6\) A matter of taste normally, but apparently not in legal matters. In February of 2018, Oakhurst Dairy settled a suit filed by company drivers concerning unpaid overtime for $5,000,000. The dispute centered on a piece of syntax in Maine’s overtime law, which required that workers be paid 1.5 times their hourly wage for each hour exceeding 40 hours per week. The suit concerned the handling – in one way or another – of certain, expressly enumerated food products (quoting from the appeals court decision that ruled in favor of the drivers (https://cases.justia.com/federal/appellate-courts/ca1/16-1901/16-1901-2017-03-13.pdf?ts=1489437006). The piece of syntax in dispute, which is not a full sentence even though it is punctuated as one, formulates one exemption to the protection of the overtime law as:

The canning, processing, preserving, freezing, drying, marketing, storing, packing for shipment or distribution of:

(1) Agricultural produce;
(2) Meat and fish products; and
(3) Perishable foods.

The issue is whether the coordinate structure in the first part before the colon contains 8 conjuncts or 9. That is, does it exempt distribution as a separate and equal activity?