第 8 章　冠詞　(Articles)

不定冠詞：a,　定冠詞：the ⇒ 名詞の前に置き，その名詞の概念，
適用範囲を明示.

冠詞の選び方（6 種類）　(1) 数えられるか否か？
(2) 単数か否か？
(3) 限定できるか否（不特定）か？

Start → [U]		限定的 →	the	the behavior
		不特定 →	無冠詞 (ϕ)	behavior
→ [C]	*s.*（単数）	限定的 →	the	the electron
		不特定 →	a (an)	an electron
	pl.（複数）	限定的 →	the	the electrons
		不特定 →	無冠詞 (ϕ)	electrons

不定冠詞 <u>a</u> の基本的用法

「**読み手から見て不特定**である」と書き手が考えている場合の、
可算名詞[C]単数に付ける.

定冠詞 <u>the</u> の基本的用法

(1) 最初に「不特定」として導入された名詞に 2 回目以降に言及するとき.
(2) どのひとつについて言及しているのかはっきりしていて,
<u>**読者・聞き手**</u>が間違える可能性のない名詞のとき.
　the sun (= the sun of our solar system)
(3) the *n. of* ...：名詞が直後の説明で特定される場合
　<u>The</u> area of a circle is equal to πr^2.
(4) 名詞が形容詞の最上級や序数によって限定されている場合.
　the most sensitive detector,　the third law of thermodynamics
(5) the+[C]単数　の形で、種族全体を表す;　**「…というものは」**
　The electron has a negative charge.　The brain is extremely complicated.

チェック方法

(1) [C] (a countable noun) なら必ず a か the か、あるいは複数形が必要。
(2) a と the を取り替えてみてチェックする.
　[C] *pl.* や[U]の場合は the を取ったり付けたりしてみる.
(3) this/these, that/those で置き換えられれば the が適当.
(4) a certain を付けてもおかしくなければ a または ϕ が適当.

A.J. Leggett:「科学英語論文のすべて」第 2 版（丸善，1999）第 4 章.

“**The**” はあなたが話をしている対象がただひとつであることをふつう暗示ししている．一方，“**a**”（あるいは複数の場合に冠詞のないこと）はそれがただ一つでないことを言外に意味している．従って

“**The** solution of (3.9) is given by (3.10).”

は，この解がただ一つしかないことを暗に意味しているが，一方

“**A** solution of (3.9) is given by (3.10).”

は少なくとも他の解がありうることを意味している. 次の「対になった文」を比較してみよう.

f(x) is an analytic function of *x*.
f(x) is the function of *x* defined by (3.11).

f(x) is a Bessel function.　(ベッセル関数は数多くある)
f(x) is the Airy function.　(エアリー関数はただ一つしかない)

（その系が 3 次元系であると仮定して）
Two components of the momentum commute with *H*.
The three components of the momentum commute with *H*.

Very small values of *t* are unphysical.
The very small values of *t* given by Eq. (6) are unphysical.

(Exercise 8-1) カッコのなかに適当な冠詞，またはϕ（無冠詞）を入れよ．

1. The weight of (1) molecule is the sum of the weights of all the atoms that constitute (2) molecule.
2. (3) Internet is (4) phenomenon of the late twentieth century.
3. Pick (5) point on this curve and draw (6) tangent to (7) point.
4. (8) Dirac's theory lead to (9) equation of motion for an electron treated as a point particle.

Heisenberg's uncertainty principle; the uncertainty principle
Maxwell's equations, Ohm's law
the Bohr radius, the Boltzmann constant, the Planck constant

5. Figure 4 shows (10) X-ray diffraction patterns for (11) films prepared at substrate temperatures of 140°C and 400°C.
6. (12) point at which these convex and concave <u>curves</u> meet is called (13) point of inflection.

the convex and the concave <u>curve</u> も可
(the structures and properties of conducting polymers)

7. (14) diagonal of (15) parallelogram divides (16) parallelogram into (17) two congruent triangles.

原田豊太郎：「英語論文執筆ガイド」（講談社, 2002）などより．

(Exercise 8-2) Fill in the parentheses with the most appropriate articles (a, an, the, or ϕ). まずは語感も重視してすばやく解答し，次に上の「選び方」を参考にじっくり検討せよ．

(1) (1) probability of (2) event in (3) ideal experiment is given by (4) square of (5) absolute value of (6) complex number ψ which is called (7) probability amplitude.

P = probability
ψ = probability amplitude
$P = |\psi|^2.$

(2) When (8) event can occur in (9) several alternative ways, (10) probability amplitude for (11) event is (12) sum of (13) probability amplitudes for (14) each way considered separately. There is (15) interference.

$\psi = \psi_1 + \psi_2$
$P = |\psi_1 + \psi_2|^2.$

(3) If (16) experiment is performed which is capable of determining whether (17) one or another alternative is actually taken, (18) probability of (19) event is (20) sum of (21) probabilities for (22) each alternative. (23) interference is lost.

$P = P_1 + P_2.$

From R. P. Feynman, R. B. Leighton, and M. L. Sands: *The Feynman Lectures on Physics* (Addison-Wesley, 1965) Vol. III, Sec. 1-7.

(Exercise 8-3) Complete the following passage by filling in the most appropriate articles (a, an, the, or ϕ).

At about one-hundredth of (1) second, (2) earliest time about which we can speak with (3) any confidence, (4) temperature of (5) universe was about (6) hundred thousand million (10^{11}) degrees Centigrade. This is much hotter than in (7) center of even (8) hottest star, so hot, in (9) fact, that (10) none of (11) components of (12) ordinary matter, (13) molecules, or atoms, or even (14) nucleus of (15) atoms could have held together. Instead, (16) matter rushing apart in this explosion consisted of (17) various types of (18) so-called (19) elementary particles, which are (20) subject of (21) modern high-energy nuclear physics.

From S. Weinberg: *The First Three Minutes* (Basic Books, 1993).

(Exercise 8-4) Complete the following passage by filling in the most appropriate articles (a, an, the, or ϕ).

One of (1) most popular beliefs about (2) "strangeness" of (3) quantum mechanics has to do with (4) Heisenberg uncertainty principle, which states that it is impossible to know with (5) total precision both (6) momentum and the position of (7) object at (8) same time. In (9) common understanding, the uncertainty principle is taken for (10) statement that (11) world is unpredictable. Just (12) opposite is true: The uncertainty principle is actually (13) recipe for making (14) measurements with (15) incredible accuracy.

(Exercise 8-5) Complete the following passage by filling in the most appropriate articles (a, an, the, or ϕ).

(1) phenomenon of (2) superconductivity is (3) remarkable example of (4) quantum effects operating on (5) truly macroscopic scale. In (6) superconducting material, (7) finite fraction of (8) electrons are in (9) real sense condensed into (10) "macromolecule" (or "superfluid") which extends over (11) entire volume of (12) system and is capable of (13) motion as (14) whole. At (15) zero temperature (16) condensation is complete and all (17) electrons participate in forming this superfluid, although only those electrons near (18) Fermi surface have their motion appreciably affected by (19) condensation. As (20) temperature is increased, (21) fraction of (22) electrons evaporate from (23) condensate and form (24) weakly interacting gas of (25) excitations (or "normal fluid"), which also extends throughout (26) entire volume of (27) system, interpenetrating (28) superfluid. As (29) temperature approaches (30) critical value T_c, (31) fraction of (32) electrons remaining in (33) superfluid tends to zero and (34) system undergoes (35) second-order phase transition from (36) superconducting to the normal state.

From J. R. Schrieffer, *Theory of Superconductivity*, (Perseus Books, 1964/1999) .

From Prof. Glenn Paquette's lecture (at Kyoto Univ.):

Two rules in choosing proper articles:

1. Countability

   A noun is countable if and only if it has a well-defined boundary.
   (Countable なら 原型に ϕ は不可)

2. Specification

   A noun is specified if and only if the information available to the READER singles out a unique thing.
   (Specified なら the)

   In Fig. 1, we plot $f(x)$ with ( ) open circles.
   ( ) open circles in Fig. 1 represent $f(x)$.

(Exercise 8-6) by Glenn Paquette

Complete the following passage by filling in the most appropriate articles (a, an, the, or ϕ).

1. The quantity $\hbar$ has ( ) interesting physical interpretation.
2. In this case, ( ) operator of this kind does not exist.
3. The above results provide ( ) clear understanding of ( ) resonant behavior.
4. Next, we reduce this set of equations to ( ) system of ( ) simpler equations.
5. We consider ( ) simple equation $d\tau(x)/dx = f(x)$, where $f(x)$ is ( ) second function appearing in (3.4).
6. We plot ( ) coupling strength as ( ) function of y in Fig. 1 (a).
7. However, note here that $F(\gamma; t)$ is not ( ) continuous function of γ.
8. This behavior is described by ( ) following equation: $A = B$.
9. One of ( ) main results is given in the next section.
10. This statement removes most of ( ) ambiguities.
11. This appears to be equivalent to ( ) ordinary second quantization formalism.
12. This treatment is analogous to ( ) standard algebraic treatment of the harmonic oscillator.
13. In this case it is most convenient to use ( ) cylindrical coordinates.
14. Suzuki *et al*. applied unitary analysis to ( ) data obtained in such experiments.
15. Synchronous activity in ( ) brain seems to be generated and maintained by ( ) interactions among neurons.

Vesilind's laws of experimentation:

1. If reproducibility may be a problem, conduct the test only once.
2. If a straight line fit is required, obtain only two data points.