

UNITED WISDOM

Symbiosis and Competition as Different Relations in Nature

World and Consciousness

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Epigraph

> *“in a large and metaphorical sense”.*

Charles Darwin, On the Origin of Species, first edition, 1859, Chapter III: this qualifies his expression “Struggle for Existence”. The surrounding passage includes dependence between organisms and success in leaving offspring, alongside direct encounters. The Russian version is our own translation of this fragment of the English original.

What this article is about

Nature is often described either as a war of all against all or as a model of universal cooperation. Both pictures can obscure particular relationships. A lasting close association does not necessarily mean mutual benefit; competition for a resource does not require conscious hostility; living together does not establish that the participants help each other. To understand what happens, we need to name the partners, resource, conditions, and basis of our conclusion. We will compare Darwin’s broad expression “Struggle for Existence”, an ecology textbook’s definitions, experimental research on competition between algae, and a study of exchange between plants and mycorrhizal fungi. Their questions and the available evidence differ. An invented teaching diagram will show why different relations do not add up to a single moral slogan about nature. This distinction makes figurative language more accountable and leaves human cooperation with grounds of its own.

I. Two Words Can Answer Different Questions

Imagine a teaching notebook showing a plant, a fungus, and two hypothetical neighbouring plants. A note says: “There is symbiosis here, so there is no competition.” The diagram is invented; it records no observations from a real site. Its first clause describes a presumed close association between a selected pair. The second reaches a conclusion about every relationship in the scene. A supporting step is missing. Even if one particular pair benefits mutually, that does not describe its relations with neighbours or the use of resources elsewhere. A useful diagram lets us ask exactly which participants an arrow joins and what action it represents. An overall impression of connectedness cannot establish each connection a reader supplies.

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Biology 2e uses “symbiosis” broadly for a lasting close association between individuals of different species. Within this framework it distinguishes commensalism, mutualism, and parasitism. Benefit to the participants is a different question from the duration and closeness of their association. These are two axes of description. In ordinary speech, symbiosis sometimes means mutual benefit specifically; a writer needs to make the chosen usage clear. We do not claim that every scientist employs the term identically. Here we adopt the textbook’s stated broad framework and retain a distinction between the name of an association and the effects it has on its participants. The meaning of the comparison depends on that choice.

Several limited statements can therefore replace the notebook’s sweeping caption. The presumed pair is closely associated; any exchange needs a separate explanation; relations between neighbouring plants require another question. Corresponding evidence would be needed for a real place. In our notebook these remain teaching assumptions that organise an inquiry. We need not decide whether nature is good or bad before examining the arrows. We can first distinguish the relationship, scale, and material available. The two words then cease to be automatic opposites that cancel each other without investigation. They direct attention to different aspects of a system, each with its own possible evidence and limits.

II. Symbiosis Is Not a Promise of Mutual Benefit

Under the broad definition, close association can have different consequences. The textbook distinguishes benefit to both sides from benefit to one without a noticeable change to the other, and from benefit to one at the other’s expense. These descriptions help frame a question; they do not replace an investigation of a particular pair. We must specify what counts as benefit or harm, which outcome indicates it, and under what conditions. Proximity or a shared picture is insufficient. Two organisms may be visible together while the duration and consequences of their association remain unknown. Calling that symbiosis can already be too strong, even before asking whether it benefits both participants.

Our notebook should not turn closeness into evidence of help. An arrow from the plant to the fungus might represent a presumed transfer of material. Without a returning arrow, the drawing does not establish exploitation: its author may simply have omitted part of the account. With a returning arrow, it still does not establish a net benefit to both sides: conditions and other consequences remain open. These possibilities concern an invented diagram. They show why a connection and its outcome need separate treatment. Mutual benefit becomes a substantive claim when we can identify a relevant basis for each participant’s outcome, beyond the convenient symmetry of the image.

This definition does not make every association suspect. It allows us to describe mutual benefit where supported, while avoiding its attribution to every lasting relationship. The selected abstract by Kiers and colleagues concerns a particular mycorrhizal interaction

involving resource exchange. Its subject is more specific than the slogan “everything is connected”. Interconnectedness can begin an inquiry into the processes linking participants. Mutualism asks what consequences those processes have for the parties. The distinction preserves both concepts. It also leaves room for an unknown outcome, without requiring every instance of proximity to become an alliance or every incomplete picture to become evidence of harm.

III. Competition Does Not Require an Intention to Win

In the selected textbook section, competition concerns limited resources used by different organisms. Such a relation can be examined without attributing human hostility to them. If one participant’s access depends on another’s resource use, the question concerns mechanisms and conditions, without necessarily involving dislike. Different species can affect each other through their surroundings without forming an intention to obstruct. An explanation must name the resource and how it becomes limiting. “They compete” can be a useful shorthand. Without that explanation, however, the phrase can turn into a scene of deliberate confrontation. An emotional picture then takes over the work of an ecological account.

In the hypothetical notebook, two neighbouring plants can be drawn beside one resource. The drawing does not show whether one plant’s use actually restricts the other’s growth. A shared need does not establish a shortage under those conditions. We must distinguish a potential overlap from a supported conclusion about its consequences. Likewise, the absence of a visible fight does not refute a resource relationship. These questions can be asked without turning plants into people or treating every surrounding relation as equally intense competition. Scale, time, and the outcome selected determine what can be said. Missing evidence should remain an open question, rather than being filled with a familiar picture of struggle.

Darwin offers a further distinction. In Chapter III he explicitly gives struggle for existence a broad, metaphorical meaning that includes dependence and success in leaving offspring. His examples distinguish encounters over food, dependence on moisture, and a plant’s connections with other organisms. This is a historical work of natural history, rather than a complete present-day ecological classification. Nevertheless, interpreting its general expression solely as armed conflict would already misread the selected context. The reverse mistake also matters: a specific modern concept of resource competition should not disappear because Darwin’s broader expression includes other relations. A broad metaphor and a particular mechanism do different explanatory work.

IV. The Outcome of Competition Depends on the Resource

David Tilman’s 1977 article abstract describes experiments with two freshwater algal species along a resource gradient. The study compares outcomes with models of limiting-resource use. In the complete selected abstract, Asterionella was dominant when phosphate limited both species; Cyclotella was dominant when silicate limited both; the species coexisted stably when different resources limited them. We have not read the complete methods and data, recalculated numerical estimates, or extended this laboratory account to every community. Its relevant finding is conditional: the reported answer changed with resource limitation. It cannot be reduced to the permanent name of a winner, detached from the circumstances of the competition.

The example does not support a claim that competition always ends in one participant’s destruction. Nor does it establish that resource separation will necessarily enable any species to live together. Both universal formulas would exceed the evidence read. We can revise the teaching caption from “the first plant is stronger overall” to “it may have an advantage under this assumed condition; the resource and outcome need checking”. This describes an analytical distinction, not a real plant. “Which is stronger?” becomes substantive only after specifying the relationship and limitation. Without that qualification, a particular outcome becomes an organism’s permanent attribute, as if superiority travelled with it independently of its environment.

Conditional explanation is not weak explanation. It identifies where the conclusion has support and how an alternative could be examined. Changing a resource condition in an experimental question differs from freely renaming the loser: a condition relevant to the mechanism changes. A particular model can therefore explain different outcomes without implying that anything can happen without causes. This helps distinguish dependence on conditions from arbitrariness. An ecological relation describes a connection, rather than conferring an eternal title. A supported conclusion about the selected pair and limitation remains knowledge of that subject. A wider extension would need additional grounds, rather than more confident phrasing.

V. Mutual Benefit Also Requires a Mechanism

Kiers and colleagues' 2011 study examines exchange between plants and arbuscular mycorrhizal fungi with multiple partners. In the complete abstract, the authors report manipulating interactions: plants directed more carbohydrates to particular fungal partners, while fungi increased nutrient transfer to roots supplying more carbohydrates. They connect the stability of the studied mutualism with bidirectional control of exchange. The complete methods, results, and supplementary material have not been read here; details absent from the abstract are not supplied by inference. We use a bounded reported mechanism. This does not make the study evidence of universal underground harmony or a conscious agreement between plants and fungi.

"Reward", "best partner", and "control" briefly express the reported dependency. Their meaning belongs to resource exchange and the research comparison, rather than moral evaluation. A favourable exchange rate does not turn a fungus into a good person, and a change in material transfer does not establish resentment. To read this language accurately, we should unpack the available process: what was changed, which transfer was compared, and what limited conclusion the authors reported. Our diagram consequently needs distinct arrows naming their contents, rather than a general caption saying "they help". Mutual benefit is interesting because of how the connection works; it requires explanation as much as competition does.

With multiple partners, maintaining exchange becomes an important research question because contributions and returns may differ. This is a research problem, rather than evidence of human intentions to exploit. We should retain it without a moralising translation. If all mutualism is called an unconditional unity of interests, the reported question disappears. If every condition is called concealed hostility, the supported reciprocal transfer disappears. Between those pictures lies a particular relationship whose contributions and responses can be investigated. It permits cooperation to be discussed in a specific biological sense. Closeness need not become friendship, and limits on an analogy need not erase the information available about exchange.

VI. Coexistence Does Not Establish Mutual Benefit

Tilman’s article and Kiers’s study examine different processes. In the first selected finding, two species can coexist under different resource limitations. In the second, a conditional reciprocal exchange between plants and fungi is investigated. The participants’ continued existence does not make these cases equivalent. Mutualism needs grounds for the benefit each party obtains from the relation. For coexistence, the more limited statement is that both populations persist under the selected conditions. Direct help cannot be added merely because the outcome looks peaceful. Organisms can occupy a shared space with different needs, compete without complete exclusion, or form a closely associated pair with unequal consequences. The explanation must identify its subject.

The notebook can place two hypothetical plants in separate areas of resource use. If both persist, this still does not depict an exchange between them. Adding exchange would require a new arrow and a new supporting basis. Conversely, an exchange within one pair does not show that every other organism in the diagram benefits from all the rest. Visual proximity can conceal that step. Labelling each connection helps retain the result’s scale: a pair, a population, a site, or a wider network. The drawing remains a teaching construction. Its purpose is to show what information cannot be obtained simply from the general fact of shared presence.

This distinction does not diminish peaceful coexistence in human life. It prevents a human duty to cooperate from being proved by the laboratory persistence of two algae. People can value coexistence and agree arrangements for it on grounds of their own. The biological concept answers another question and supplies no ready-made rule. When nature is offered as an example, we should specify which part of the comparison transfers and which belongs to our choice. Otherwise the same image can demand unconditional mutual aid or the removal of a competitor. Precision preserves human evaluation and the ecological conclusion, without requiring either to substitute for the other.

VII. One Organism Can Have Several Different Relations

The multiple partners in Kiers’s abstract remind us that one relation need not describe a participant’s entire life. A plant is examined in a particular exchange; that does not make every connection it has equivalent to that exchange. The notebook can separately draw a presumed connection with a fungus and a possible resource overlap with a neighbouring plant. Those arrows answer different questions and do not logically cancel each other. Establishing them as facts about a real site would require investigation. Here we demonstrate that distinct subjects of description can be compatible. One supported relation cannot establish that an organism participates solely in cooperation or solely in competition under every circumstance.

We should also distinguish a pair from its participants considered in other comparisons. One organism may obtain a particular resource through one relation and share use of another with a different neighbour. The selected diagram does not automatically report the sum of all benefits and costs. To discuss an overall outcome, its author must name how that outcome is determined and consider relevant processes. A conclusion about one connection can be useful on its own. The error begins with an unnoticed extension: a particular exchange becomes a feature of the entire system, or one competitive relation becomes a complete account of nature. A clear unit of analysis reduces the need for a single all-purpose picture.

The sources preserve different scales. The textbook organises concepts of interaction; Tilman’s experiment compares resource conditions for a selected pair; Kiers’s study examines exchange involving multiple partners; Darwin describes broad dependencies and indirect chains. These cannot be combined as equivalent measurements of one overall friendliness of the world. Their comparison offers different questions for a diagram: which participants, which relation, which result, under what conditions? A more detailed picture becomes possible, with relationships distinguished by subject and scale. It promises no complete knowledge. Instead, it makes limited information usable for reflection, without requiring a choice of one slogan about all of nature.

VIII. An Indirect Connection Needs Evidence for Its Links

In the selected passage of Chapter III, Darwin discusses clover, humble-bees, mice, and cats as an example of distant connections. He distinguishes his own experiments on the usefulness of bee visits, another observer’s report, and a further inference about cats possibly affecting flower abundance through intervening links. This is a historical text from 1859. We do not present the entire chain as an independently confirmed present-day field measurement. Its reasoning matters: an effect need not be confined to a direct pair. Yet a conclusion about an indirect outcome needs support along the intervening links. Calling something a network does not prove every connection we can imagine after learning its participants’ names.

We can add a third hypothetical participant to the notebook, one presumed to change a partner’s availability. The original relationship then becomes part of a more complex question. The new arrow should not automatically follow from neighbouring symbols. Its proposed action must be established separately and then related to the next link. An unknown transition limits the overall conclusion accordingly. This remains a teaching explanation, rather than a programme for intervening in a real garden. No living organisms are removed or introduced for the drawing. The object of the exercise is our own assertion: does it say more about the complete outcome than we know about the proposed chain’s parts?

Comparison with Tilman’s resource gradient distinguishes a direct experimental arrangement from a historical chain of observations, reports, and inferences. Both require conditions, but

their supporting grounds are organised differently. Confidence in one link should not extend automatically to the rest. Indirect relations do not cease to exist simply because they are difficult to investigate. We can state a hypothesis and the information it would require. A reader then sees the structure of a particular proposal, beyond “everything affects everything”. That structure identifies where a change might matter, and which transition is currently sustained by reasoning rather than investigated material.

IX. From Observation to a Name for the Relation

An overall impression cannot determine every interaction at a real site. Even careful observation initially reports what an observer could access during a particular time. Visible contact may suggest a question about lasting association; shared presence, a question about resources; a changed outcome, a question about a possible cause. The material, conditions, and alternatives then need clarification. In the notebook we can mark which arrows were invented to explain a distinction, which represent a source’s reported finding, and which still need investigation. This is more useful than “proved” when that word combines observation, a model, and an attractive illustration without showing the steps between them.

For benefit, retain the participants and criterion. Receiving material does not always disclose an organism’s complete outcome; a selected experimental result does not establish that result under every condition. For competition, a common need does not identify the limiting resource. For a lasting association, one contact does not demonstrate duration. These questions differ and need different kinds of material. We do not ask readers to reproduce laboratory experiments or intervene in an ecosystem. They can examine their descriptions and an accessible primary report, making its scope explicit. A complete article, an abstract, and a teaching example have different reach, even when their titles sound equally convincing.

This is what makes language accountable to evidence. A changed condition or newly available relevant material can change a relationship’s name or a conclusion’s scope. That need not defeat the original question: sometimes a useful question receives a different answer. A particular observation can be retained while an excessive inference is dropped. A limited experimental finding can be kept without becoming a law of all nature. Cooperation can remain our own metaphor without being declared a measured condition of every participant. Such work enables more distinctions and more precise questions. It neither promises a world already in agreement nor requires every unknown connection to be treated as concealed struggle.

X. A Natural Relation Does Not Choose for a Person

A description of competition does not justify human cruelty; a description of mutual benefit does not create a duty to give without limits. Those moral steps need grounds of their own and attention to the people involved. Ecological concepts concern particular processes. People can discuss values, agreements, and limits on participation. A comparison with nature may suggest questions about dependence or the conditions of exchange. It does not remove responsibility for choosing a rule. When someone says “nature works this way, therefore you must”, we should notice the added prescription. It is not established merely because the preceding clause contains a genuine biological example or a familiar researcher’s name.

This does not prevent learning from natural systems. We can become interested in conditional exchange, different resources, indirect consequences, or the scale of a connection. We must then make the human subject explicit: who chooses, what they agree, which information is available, and which limit they wish to retain. Relations between people need their own grounds at that stage, rather than an automatic transfer of a laboratory model. Neither hostility nor mutual benefit encompasses every human conversation. A precise comparison leaves room for different values and independent decisions. Nature remains a subject of knowledge and a source of questions, with its complexity intact, instead of becoming a ready-made voice for our preferred command.

The invented notebook ends with separate, labelled relations. Symbiosis in the broad sense is distinguished from mutual benefit, competition from conscious hostility, coexistence from exchange, and an indirect chain from an established complete outcome. Darwin’s metaphor retains its historical breadth; the selected modern studies retain their conditions. We gain a richer question about nature without declaring the whole world either war or harmony. This also assists human reflection. We can value cooperation, recognise overlapping interests, and discuss limits, without making one biological fact do all the work of our decision or turning a complex network into a simple moral prescription.

What this means in practice

1. Choose a sentence of your own about “cooperation” or “struggle” in nature. Name two participants, the presumed connection, resource, and selected outcome. Mark what is actually known, what a source reports, and what is drawn or invented for explanation. Keep the teaching diagram distinct from a real observation.

2. Clarify the question: does it concern lasting close association, the participants’ benefit, a limited resource, or their continued coexistence? Avoid inferring one from another automatically. For an indirect chain, identify its separate transitions. Leave an unsupported step open, rather than replacing it with “network”, “the strongest”, or “universal harmony”.

3. Write a more precise description without intervening in a living system. If you want to use it as a human analogy, separately identify your value and the comparison’s limit. This is a voluntary author-created exercise with no tested efficacy, diagnosis, ecological experiment, or promise to change relationships. Biological explanation and human decision remain different tasks.

Key quotation

> *“partners offering the best rate of exchange are rewarded”*.

E. Toby Kiers and colleagues, final clause of the abstract of Reciprocal rewards stabilize cooperation in the mycorrhizal symbiosis, 2011. English original; the Russian version is our own translation. “Best” concerns the reported resource comparison. Conscious agreement and moral superiority are not attributed to the organisms.

Connections between traditions

1. **Broad struggle — classification of close association.** Darwin, Chapter III, the qualification of his metaphor and dependence; Biology 2e, 45.6, the broad definition of symbiosis and different consequences. A general historical expression and a particular classification ask different questions. Struggle is not confined to competition, and symbiosis need not benefit both participants.

2. **A limited resource — a conditional outcome.** Biology 2e, competition and resource partitioning; Tilman, the complete abstract on the phosphate and silicate gradient. Specify mechanisms and conditions instead of permanently naming a winner. Two experimental algae do not become a law of every community; a teaching illustration does not become a new experiment.

3. **Reciprocal transfer — competitive coexistence.** Kiers and colleagues, the exchange abstract; Tilman, the abstract describing persistence under different limitations. Continued coexistence can have different explanations. Coexistence does not establish mutual help, and resource exchange is not a conscious agreement.

4. **Dependence — conditional exchange.** Darwin, Chapter III, mistletoe, trees, and birds; Kiers and colleagues, bidirectional resource transfer. Name the processes connecting participants while retaining the differences between the systems. Darwin is not made the author of every later mechanism; plants and fungi are not credited with human kindness.

5. **An indirect chain — a resource advantage.** Darwin, Chapter III, clover, humble-bees, mice, and cats; Tilman, the resource-gradient abstract. Examine each link and limiting condition,

rather than constructing a general ladder of winners. A historical report and inference are not a newly confirmed field experiment; a laboratory pair is not the entire ecosystem.

6. **Broad association — investigated mutualism.** Biology 2e, symbiosis, mutualism, and parasitism; Kiers and colleagues, the conclusion about bidirectional control. A definition does not replace evidence about each participant's outcome and the mechanism of exchange. The selected result establishes neither universal symbiotic harmony nor economic or moral rules for people.

Primary sources

1. Charles Darwin. On the Origin of Species, Chapter III. English original of the first edition, 1859. The selected qualification of the broad meaning of struggle, its surrounding context, and the passage on clover, humble-bees, mice, and cats were read. Darwin's experiments, another observer's report, and Darwin's inference are distinguished. Reading the entire chapter or book is not claimed. The Russian epigraph is our own translation of the original.

2. Mary Ann Clark, Matthew Douglas, Jung Choi. Biology 2e, 45.6 Community Ecology. OpenStax, 2018, English-language textbook. Selected definitions of competition, resource partitioning, broad symbiosis, commensalism, mutualism, and parasitism were read. This is a textbook synthesis of concepts, rather than a new experimental report; reading the entire chapter or book is not claimed. Medical examples are not used for advice.

3. E. Toby Kiers and colleagues. Reciprocal rewards stabilize cooperation in the mycorrhizal symbiosis. Science 333(6044), 2011, 880–882, English original. The complete primary abstract in PubMed and author and publication framing were read. Complete methods, results, and supplementary material were not read. The reported mechanism and conclusion are used within their scope, without extension to every mycorrhizal network. The Russian key quote is our own translation of the original.

4. David Tilman. Resource Competition between Plankton Algae: An Experimental and Theoretical Approach. Ecology 58(2), 1977, 338–348, English original. The complete publisher abstract on two algae, resource models, and differing outcomes was read. Complete methods, results, and the PDF were not read; numerical estimates were not recalculated. The selected experimental conditions are not presented as all natural competition.

Tags

#symbiosis, #competition, #mutualism, #commensalism, #parasitism, #ecology, #relation, #resource, #limitation, #exchange, #partner, #benefit, #conditions, #coexistence, #niche, #dependence, #network, #indirectConnection, #population, #gradient, #mycorrhiza, #algae, #plants, #fungi, #metaphor, #humanChoice, #Darwin, #Tilman, #Kiers, #precision

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