Excerpts from Works of John Dewey:

*How we Think*, 1910*

selected by Glen Pate, email: GlenPate@acm.org

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I The Problem of Training Thought

I.1 What is Thought?

I.2 The Need for Training Thought

p. 27

... it is the business of education to cultivate deep-seated and effective habits of discriminating tested beliefs from mere assertions, guesses, and opinions; to develop a lively, sincere, and open-minded preference for conclusions that are properly grounded, and to ingrain into the individual’s working habits methods of inquiry and reasoning appropriate to the various problems that present themselves. The formation of these habits is the Training of Mind.

I.3 Natural Resources in the Training of Thought

p. 38

... ‘thinking’ is a term denoting the various ways in which things acquire significance. Thinking is specific, not a machine-like, ready-made apparatus to be turned indifferently and at will upon all subjects, as a lantern may throw its light as it happens upon horses, streets, gardens, trees or river. Thinking is specific, in that different things suggest their own appropriate meanings, tell their own unique stories, and in that they do this in very different ways with different persons. Any subject, from Greek to cooking, and from drawing to mathematics, is intellectual, if intellectual at all, not in its fixed inner structure, but in its function – in its power to start and direct significant inquiry and reflection. What geometry does for one, the manipulation of laboratory apparatus, the mastery of a musical composition, or the conduct of a business affair, may do for another.

I.4 School Conditions and the Training of Thought

p. 56

I.5 The Psychological and the Logical

The Means and End of Mental Training:
The Psychological and the Logical

Introductory: The Meaning of Logical

... In the broadest sense, any thinking that ends in a conclusion is logical... that is, the term logical covers both the logically good and the illogical or the logically bad. In its narrowest sense, the term logical refers only to what is demonstrated to follow necessarily from premises that are definite in meaning and
that are either self-evidently true, or that have been previously proved to be true. Stringency of proof is here the equivalent of the logical. In this sense mathematics and formal logic (perhaps as a branch of mathematics) alone are strictly logical. Logical, however, is used in a third sense, which is at once more vital and more practical; to denote, namely, the systematic care, negative and positive, taken to safeguard reflection so that it may yield the best results under the given conditions. If only the word artificial were associated with the idea of art, or expert skill gained through voluntary apprenticeship (instead of suggesting the factitious and unreal), we might say that logical refers to artificial thought. In this sense, the word logical is synonymous with wide-awake, thorough, and careful reflection — thought in its best sense ... is turning a topic over in various aspects and in various lights so that nothing significant about it shall be overlooked—almost as one might turn a stone over to see what its hidden side is like or what is covered by it. thoughtfulness means, practically, the same thing as careful attention, ... . Analogy with the accuracy and definiteness of mathematical combinations gives us such expressions as calculate, reckon, account for; and even reason itself — ratio. Caution, carefulness, thoroughness, definiteness, exactness, orderliness, methodic arrangement, are, then, the traits by which we mark off the logical from what is random and casual on one side, and from what is academic and formal on the other. No argument is needed to point out that the educator is concerned with the logical in its practical and vital sense. Argument is perhaps needed to show that the intellectual (as distinct from the moral) end of education is entirely and only the logical in this sense; namely, the formation of careful, alert, and thorough habits of thinking.

Marginal emphasis, p. 57-62:
Whole object of intellectual education is formation of logical disposition
False opposition of the logical and psychological
Opposing the natural to the logical
Neglect of the innate logical resources
...
Formal Method
Reaction toward lack of form and method
Logic of subject-matter is logic of adult or trained mind
The immature mind has its own logic
Hence, the psychological and the logical represent the two ends of the same movement
p. 62
Any teacher who is alive to the modes of thought naturally operative in the experience of the normal child will have no difficulty in avoiding the identification

1 gp: nota bene: as Peirce, not the other way around as Frege, Russell, Whitehead
of the logical with a ready-made organization of subject-matter, as well as the
notion that the only way to escape this error is to pay no attention to logical
considerations. Such a teacher . . . . will see that the psychological and the
logical, instead of being opposed to each other (or even independent of
each other), are connected as the earlier and later stages in one continuous
process of normal growth.

**Discipline and Freedom**

p. 63

Discipline represents original native endowment turned, through gradual
eexercise, into effective power. So far as a mind is disciplined, control of method in
a given subject has been attained so that the mind is able to manage itself independendly without external tutelage\(^2\). The aim of education is precisely to
develop intelligence of this independent and effective type – a disciplined mind.
Discipline is positive and constructive.

**II Logical Considerations**

**II.6 The Analysis of a complete act of thought**

p. 74

The essence of critical thinking is suspended judgment; and the essence of
this suspense is inquiry to determine the nature of the problem before proceeding
to attempts at its solution. This, more than any other thing, transforms mere
inference into tested inference, suggested conclusions into proof.

p. 75

(a) Suggestion is the very heart of inference; it involves going from what is
present to something absent. Hence, it is more or less speculative, adventorous.
Since inference goes beyond what is actually present, it involves a leap, a jump,
the propriety of which cannot be absolutely warranted in advance. . . . (b) The
suggested conclusion so far as it is not accepted but only tentatively entertained
constitutes an idea. Synonyms for this are supposition, supposition,
conjecture, guess, hypothesis, and (in elaborate cases) theory.

**II.7 Systematic Inference: Induction and Deduction**

p. 79

**The Double Movement of Reflection**

\(^2\)cf Kant, Was ist Aufklärung?
The characteristic outcome of thinking we saw to be the organization of facts and conditions which, just as they stand, are isolated, fragmentary, and discrepant, the organization being effected through the introduction of connecting links, or middle terms. The facts as they stand are the data, the raw material of reflection; their lack of coherence perplexes and stimulates to reflection. There follows the suggestion of some meaning which, if it can be substantiated, will give a whole in which various fragmentary and seemingly incompatible data find their proper place.

p. 86

Summary: definition of scientific induction:

Scientific induction means, in short, all the processes by which the observing and amassing of data are regulated with a view to facilitating the formation of explanatory conceptions and theories.

II.8 Judgment: The Interpretation of Facts

p. 109

Animals learn (when they learn at all) by a “cut and try” method; by doing at random first one thing and another thing and then preserving the things that happen to succeed. Action directed consciously by ideas — by suggested meanings accepted for the sake of experimenting with them — is the sole alternative both to bull-headed stupidity and to learning bought from that dear teacher — chance experience. ... An idea is a method of evading, circumventing, or surmounting through reflection obstacles that otherwise would have to be attacked by brute force.

§3 Analysis and Synthesis

p. 114

As analysis is conceived to be a sort of picking to pieces, so synthesis is thought to be a sort of physical piecing together; and so imagined, it also becomes a mystery. In fact, synthesis takes place wherever we grasp the bearing of facts on a conclusion, or of a principle on facts. As analysis is emphasis, so synthesis is placing; the one causes the emphasized fact or property to stand out as significant; the other gives what is selected its context, or its connection with what is signified. Every judgment is analytic in so far as it involves discernment, discrimination, marking off the trivial from the important, the irrelevant from what points to a conclusion; and it is synthetic in so far as it leaves the mind with an inclusive situation within which the selected facts are placed.

II.9 Meaning: or Conceptions and Understanding

p. 117
As intelligent beings, we presume the existence of meaning, and its absence is an anomaly. . . . All knowledge, all science, thus aims to grasp the meaning of objects and events, and this process always consists in taking them out of their apparent brute isolation as events, and finding them to be parts of some larger whole suggested by them, which, in turn accounts for, explains, interprets them; i.e. renders them significant.

p. 119 Most languages have two sets of words to express . . . two modes of understanding; one for the direct taking in or grasp of meaning, the other for its circuitous apprehension, this: . . . kennen and wissen in German; . . . ; while in English to be acquainted with and to know of or about have been suggested as equivalents. . . .

p. 120
Our intellectual progress consists, as has been said, in a rhythm of direct understanding – technically called apprehension – with indirect, mediated understanding – technically called comprehension.

p. 127
. . . scientific notions make explicit the systematizing tendency involved in all use of concepts. . . . A conception is a meaning that supplies a standard rule for the identification and placing of particulars . . .

p. 129
. . . conceptions are general because of their use and application, not because of their ingredients.

p. 130
Vagueness disguises the unconscious mixing together of different meanings. . . . It is the aboriginal logical sin. . . . To be clear or perspicuous a meaning must be detached, single, self-contained, homogeneous as it were, throughout. The technical name for any meaning which is thus individualized is intension. The process of arriving at such units of meaning (and of stating them when reached) is definition.

p. 131
. . . intension is meaning as a principle of identifying particulars; extension is the group of particulars identified and distinguished.

p. 133
Popular definitions select certain fairly obvious traits as keys to classification. Scientific definitions select conditions of causation, production, and generation as their characteristic material.

II.10 Concrete and Abstract Thinking

p. 135
The maxim enjoined upon teachers, “to proceed from the concrete to the abstract,” is perhaps familiar rather than comprehended. . . . . . if the abstract to which we are to proceed denotes thought apart from things, the goal recommended is formal and empty, for effective thought always refers, more or less directly, to things.

p. 136

The difference [between the concrete and the abstract] is purely relative to the intellectual progress of an individual; what is abstract at one period of growth is concrete at another; . . . There is, nevertheless, a general line of cleavage . . . . These limits are fixed mainly by the demands of practical life.

p. 137

Many notions of science are abstract . . . because the whole content of their meaning has been framed for the sole purpose of facilitating further knowledge, inquiry, and speculation. When thinking is used as a means to some end, good, or value beyond itself, it is concrete; when it is employed simply as a means to more thinking, it is abstract.

II.11 Empirical and Scientific Thinking

p. 154

The change of attitude from conservative reliance upon the past, upon routine and custom, to faith in progress through the intelligent regulation of existing conditions, is, of course, the reflex of the scientific method of experimentation. The empirical method inevitably magnifies the influences of the past; the experimental method throws into relief the possibilities of the future. The empirical method says, “Wait till there is a sufficient number of cases;” the experimental method says, “Produce the cases.” The former depends upon nature’s accidentally happening to present us with certain conjunctions of circumstances; the latter deliberately and intentionally endeavors to bring about the conjunction. By this method the notion progress secures scientific warrant.

p. 156

In short, the term experience may be interpreted either with reference to the empirical or the experimental attitude of mind. . . . experience also includes the reflection that sets us free from the limiting influence of sense, appetite, and tradition. Experience may welcome and assimilate all that the most exact and penetrating thought discovers. Indeed, the business of education might be defined as just such an emancipation and enlargement of experience.
III The Training of Thought

III.12 Activity and the Training of Thought

III.13 Language and the Training of Thought

Language as the Tool of Thinking

p. 176

The Abuse of Linguistic Methods in Education

Symbols are themselves, as pointed out above, particular, physical, sensible existences, like any other things. They are symbols only by virtue of what they suggest and represent, i.e. meanings (i) They stand for these meanings to any individual only when he has had experience of some situation to which these meanings are actually relevant. Words can detach and preserve a meaning only when the meaning has been first involved in our own direct intercourse with thing.

To attempt to give a meaning through a word alone without any dealings with a thing is to deprive the word of intelligible signification; against this attempt, a tendency only too prevalent in education, reformers have protested.

p. 177

... words that originally stood for ideas come, with repeated use, to be mere counters; they become physical things to be manipulated according to certain rules, or reacted to by certain operations without consciousness of their meaning. Mr. Stout (who has called such terms “substitute signs”) remarks that “algebraic and arithmetical signs are to a great extent used as mere substitute signs” l. . . . It is possible to use signs of this kind whenever fixed and definite rules of operation can be derived from the nature of the things symbolized, so as to be applied in manipulating the signs without further reference to their signification. A word is an instrument for thinking about the meaning which it expresses; a substitute sign is a means of not thinking about the meaning which it symbolizes.” . . . . In many respects signs that are means of not thinking are of great advantage; standing for the familiar, they release attention for meanings that, being novel, require conscious interpretation. Nevertheless, the premium put in the schoolroom upon attainment of technical facility, upon skill in producing external results, often changes this advantage into a positive detriment. In manipulating symbols so as to recite well, to get and give correct answers, to follow prescribed formulae of analysis, the pupil´s attitude becomes mechanical, rather than thoughtful; verbal memorizing is substituted for inquiry into the meaning of things.