Excerpt from
"Proposal for a Research, Development, and Teaching Project Involving the Game of Go"
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EDUCATIONAL VALUE OF GO

The many educational virtues connected with Go playing may conveniently be divided into two categories, the cognitive and the ethical. "Ethical" is used in its restricted, root sense referring to character, or personality traits, and not to the realm of moral values. The cognitive area includes all faculties involved in acquiring and processing knowledge.

COGNITIVE REALM -- Memory

Memory is involved both within each game and generally in the long-term study of Go. Each game may take an hour (on the full-sized board, which is not used with beginners) and may involve 100 to 150 moves per player. Many situations develop whose significance must be kept in mind as attention turns elsewhere. In long-term study, there are conventional situations and formulaic patterns to be learned. In many cases, the memorization occurs automatically because the particular patterns recur so often. In other cases, if you wish to become an advanced player, you must formally study and memorize the sequences (much like learning the vocabulary and idioms of a foreign language). Of course (it is important to add) it is not necessary to do a lot of formal studying in order to enjoy and benefit from Go playing.

Professional players and highest level amateurs can clear a finished game from the board and replay it entirely from memory, a feat that seems awesome without an understanding of the advanced level of cognitive organization they apply to the game.

Pattern Recognition

Go models a symbol-system (possibly a language) according to the elementary epistemological schema: pattern plus (in) context produces meaning. Memorizing an entire game involves the realization that the

300 or so apparently separate moves cluster logically as components of
many fewer patterns and themes (they are like the notes of a musical duet
in several movements).

Go is made of patterns in both space and time -- recurrences and
standardizations both of shapes on the board and of sequences of moves.
High level play coordinates these dimensions; i.e., it is not sufficient
to know only which shapes are correct, you must also know the order in
which to play them.

The patterns occur at several levels of complexity. When you are in
the process of learning them at one level, you have only the vaguest, if
any, awareness of the nature of the next level up. In terms of the schema
outlined above: fluency with the patterns at one level enables you to begin
to perceive the context that defines the next level of complexity. Once the
context is grasped, you are ready to learn the patterns appropriate to it.

To put this concretely, for example: once you have understood the pro-
cedures whereby stones may be captured and removed from the board, you
find yourself in a context of acute awareness (which you didn't have before)
of the vulnerability of both your own and your opponent's stones. You are
then ready to learn the patterns whereby stones are either attacked or
made invulnerable to attack.

The general experience of the Go student is this: a pattern which at
first must be laboriously studied and analyzed, built up repeatedly from
its elements, eventually (sometimes "suddenly") comes to exist in the mind,
and is retrievable, as a unitary figure or sequence, a gestalt. The pattern
so assimilated is then available for use as an element in a more complex
structure.

It is clear that this process displays a fundamental capability of the
mind-as-knower to manipulate information economically by organizing it
into successively more inclusive structures. Improving at Go is system-
atically to exercise, presumably to strengthen, this cognitive skill. One
of my research aims is to illuminate this process in children's thinking,
using Go learning to model it.

Many beginners report vivid and spontaneous "neural" phenomena
associated with Go -- dreams about situations on the board, visual hal-
lucinations of black and white patterns, intuitions of structural congruence
between Go situations and complex conceptual structures like debates or
discussions. The Go forms, apparently, are sufficiently compelling (basic?)
that they preoccupy the mind new to them; the mind apprehends, I believe,
that the forms are not merely new bits of data for the storage/retrieval
system, but forms of thinking (principles of organization) as well. The
mind begins to make use of the form learned from Go to organize and inter-
pret experience in everyday life.

I wish to investigate the prevalence of this phenomenon among kids who are learning Go, and if it occurs, to find ways to encourage the process, since it is useful in life. This line of inquiry has potential implications for curriculum in the area of thinking skills, inasmuch as it lays bare a process of neural-level metaphor that, at present, we understand little and use less.

Symmetry

Symmetry, a special case of patterning, seldom occurs in a game of Go in terms of the configurations of the stones on the board. On the other hand, symmetry of development through time is at the heart of the ethical basis of the game, the principle of balance -- the idea of accepting a disadvantage somewhere concurrent with taking an advantage somewhere else, the understanding that a successful game entails keeping your advantages just slightly ahead of your disadvantages.

Though spatial symmetry is rare in Go, the board itself, a square grid, has biaxial symmetry or rotational symmetry about the center point. I have devised a simple exercise using this property (originally intended simply as a "warmup" exercise) which has revealed a startling range in people's skill (both kids and adults) at perceiving this sort of symmetry.
The exercise is: the board starts empty, I place a white stone, and the student places a black one on the symmetrically opposite point, and so on. People employ very different strategies in this exercise, presumably according to various preferred cognitive styles. Some see the correct point immediately while others must laboriously hunt each time; some seem to rely on vision alone while others employ analytic techniques (such as counting in from the sides).

I am interested in attempting to correlate skill and style in this exercise with Go skill and with other forms of cognitive behavior as revealed in Go playing. More specifically, I would like to investigate the application of the exercise as a diagnostic and remedial tool in certain manifestations of dyslexia involving reversal and interchanging of letters and words.

Figure/Ground

Figure/ground considerations are basic in pattern recognition, and in the stages of Go learning, you go through several layers of figure/ground relationships. The first contact is with the finite extension of the playing field, with its edges. The board may be thought of as a 19x19-point area marked off within an infinite Cartesian grid; this restricted space, with its special properties at the edges and corners, is the first "figure" you have to come to terms with -- this is the infant stage.

When you first begin to play, you notice only the patterns of your own stones as figure; everything else -- the opponent's stones and the board with its edges -- is ground. This phase corresponds to an entirely ego-centered point of view characteristic of toddlers.

After a while you grasp that your opponent has a similarly ego-centric, diametrically opposite view of the game. When you start to see the game from the other side, you begin to be capable of noticing your own weaknesses. This ability to flip to the opponent's viewpoint, to understand it as somehow equivalent to your own, is developmentally similar to the five- to nine-year-old period.

Finally you develop an expanded capability characteristic of the more complex world of the adolescent: you see, and can switch back and forth at will between, (1) the black and white stones together as figure (patterns) against empty board and edges as ground; and (2) the empty board (territory) as figure against the black and white boundaries and the edges as ground.

Both points of view are necessary even to intermediate-level play. While within my developmental metaphor this dual viewpoint is appropriate to adolescence, even, perhaps, central to it, I have noticed that very few early adolescents are able to act on their world from this perspective. I am testing the hypothesis that Go, by abstractly modeling an expanded form of thought, will enable people to take a larger, more useful view of their situations.

Within Go, the two figure/ground perspectives apply as follows: the first (stones against board) enables you to evaluate the relative strengths of yours and your opponent's position; the second (empty board against stones) enables you to discern the potential territories as they emerge.

It's important to stress that these developments in perspective and and in facility with figure/ground manipulation occur naturally and spontaneously as you improve at the game, though it cannot be denied that some students are helped along by hearing the stages articulated. With respect to the considerations detailed below (under "Ethical"), I consider the figure/ground relationship to be the central bridging metaphor between a person's perspective on life and his or her behavior on the Go board. This is a particularly fruitful approach with adolescents, who are experiencing a new dimension of ego-in-the-world.

Bi-lateral Thinking

Go playing makes equal demands on the brain's two basic modalities, the sequential/analytic (verbal) and the global/intuitive (visual). Our culture in general and certainly our pedagogy heavily favor the former mode, creating a social posture whose caricature is the value-free technocrat busily perfecting a better detonator for the doomsday machine.

Sequential analysis, the basic skill of deductive thinking, the ability to infer immediate, linear consequences, is an indispensable tool in Go playing. It is employed at both the tactical level -- reading out the results of specific lines of play -- and the strategic level -- planning a coherent sequence of positions. To most western Go players at first, this seems to be the only kind of thinking required.

However, the need for a global analysis based on a visual 'feel' for the overall board position becomes apparent once you have advanced to the middle amateur levels. A common frustration of beginners is to spend time laboriously and (they think) cleverly executing a certain maneuver, only to have the opponent ignore it because, at that moment, play in another part of the board is more significant.

Overall board positions are so complex that no human brain can exhaust their possibilities through linear analysis (nor can any computer program). You come to develop, in the course of continual play, an intuitive sense of the balance of power vectors that are contending for dominance around the board at a given time. This sense derives from a whole-board visual analysis which is not linear but takes account of all shapes simultaneously. As your visual intuition improves, so does your confidence in playing in other parts of the board before any one part is resolved -- a necessary attitude in advanced play. In this way, a faculty is developing that is specifically attuned to the idea that life is, or can be, multi-faceted, proceeding on many fronts.

In summary, linear analysis tells you whether you can accomplish a given goal, while global intuition tells you whether (at that time, in terms of the overall position) you should accomplish it, as against doing something else. In effect, Go models the role of cognition in the setting of priorities with reference to a value-system. I take it as obvious that (1) our society is not very good at applying this perspective to its problems and (2) our educational system is not doing much about it.

ETHICAL REALM

Effects of the regular practice of Go that have ethical ("character") implications (in addition to those detailed above) include: encouragement of useful habits of mind, such as patience and concentration/attention; greater self-knowledge and consequent ability to shape your character or personality; and development of abilities necessary for responsible autonomous behavior, including the confidence that you need not be the victim of circumstance, that you can shape your own life.

You play Go much as you live your life; the dominant features of your personality inevitably show up on the board. Any character excess you may bring to the game -- whether of greed, aggression, timidity,

indecisiveness, whatever -- will impede your progress and will have
to be addressed. Of course, any activity, certainly any other strategy
game of sufficient complexity, can be seen as this sort of mirror of
personality. What makes Go particularly useful in this way is its com-
plexity combined with its emptiness: in and of itself, the game has very
little content -- unlike chess, for instance, which starts in a prescribed
position with narrowly defined pieces aimed at a specific goal.

In Go, starting with an empty board, playing with pieces whose
value comes solely from their positions, flexibly weighing alternative •
goals -- the content that emerges is almost entirely a reflection of the
two minds at work. A game record can be seen as a graphic record
(first derivative) of an hour or so of intense psychic interaction between
two people.

Awareness of this aspect of the game leads to the possibility of con-
ceiving your personality, your way of addressing the world, as plastic
rather than pre-determined, and under your control. This is especially
valuable insight at early adolescence, when the teenage personality is
under construction and ethical questions are at the forefront.

The basis for using Go as an ethical referent is, of course, its
reliance on the principle of balance, which operates spatially in the
necessity to distribute your forces evenly around the board and temporally
in the need to balance attack and defense (taking profit vs. protecting weak-
nesses). A further requirement is the need for flexibility in setting goals,
learning the correct timing for making decisions that close off options.
All these aspects have obvious parallels to conditions and situations of
everyday life -- obvious in the sense that even beginning players notice
them.

I want to investigate whether it can be demonstrably useful in the
lives of early adolescents to make these parallels continually apparent
to them as they learn Go. From this point of view, the game is seen as
providing a paradigm for the construction, from scratch, of coherent,
orderly, well-balanced "realities" -- structures having, in short, all
the positive characteristics we hope they will build into their lives.

Each game is then a "practice run" at fulfilling the paradigm in a
non-threatening context: bad judgment leading to a loss has no dire con-
sequences (only, perhaps, a knock to the ego). The board is wiped clean;
a new game begins.

I believe there is value here at two levels: (1) the practice itself,
leading to a continuously improving ability to create coherent forms; and
(2) the meta-level of personal action, at which you either feel the confi-
dence necessary to be an active agent in your own behalf, or you feel like a
victim of circumstances, incompetent to influence the forces shaping your
life.

This particular polarity is central to many of the issues of early adolescence. Obviously the interests of both our kids and our society are better served the more they learn to be agents rather than victims. My preliminary work with the age group (as well as with adults, many of whom have not resolved the issue in their own lives) has convinced me that Go is potentially a very powerful instrument in this arena.