

Cognitive Flexibility Hypertext as a Learning Environment in Economics: A Pedagogical Note

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Abstract

Instructional design in complex subjects requires the application of a sophisticated theory of cognition.* Instructional techniques and strategies that work at the knowledge and comprehension stages of cognitive development may actually inhibit learning at more advanced levels. Evaluation and synthesis require a different cognitive paradigm. The theory of cognitive flexibility is a case-based approach for the development of upper-level cognitive skills, particularly the ability to transfer knowledge to novel situations. This paper applies the theory of cognitive flexibility to instructional design in economics. An example from monetary economics illustrates the adaptation of cognitive flexibility hypertext to a knowledge management interface.**

* "Simplification of complex subject matter makes it easier for teachers to teach, for students to take notes and prepare for tests, for test-givers to construct and grade tests, and for authors to write texts. The result is a massive "conspiracy of convenience". Spiro, et al, 1987, p.180.

** The URL for the interface is <http://brainserver.thebrain.com/get.asp?i=a3f95>

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I. Introduction

Bridging the knowledge gap between experts in economics analysis and novices through the economics curriculum requires innovative approaches to the construction of learning environments. The ultimate aim, of course, is to train learners to think like experts in the field of economics. Bransford, et al (John D. Bransford, Ann L. Brown, and Rodney R. Cocking, 2000) list the following characteristics of experts' knowledge.

- Experts notice relationships and patterns of information that are not evident to novices.
- Experts have acquired a base of content knowledge that reflects deep understanding of the subject matter.
- Experts have knowledge that is conditionalized by specific circumstances
- Experts are able to retrieve relevant aspects of knowledge with little attentional effort.
- Experts know their discipline thoroughly.
- Experts have varying levels of *flexibility* in approaching new situations or scenarios.

But how do we approach the daunting questions of creating learning environments that impart economic knowledge, fosters deeper understanding of the discipline, and enhances the learners' ability to transfer economic principles to novel situations?

The theory of cognitive flexibility (R. Spiro, P. Feltovich, M. Jacobson, and R. Coulson, 1995, R. Spiro, W. Vispoel, and J. Schmitz, 1987) provides a *conceptual framework* for developing a case-based approach to addressing these issues. Instructional strategies flowing from the theory of cognitive flexibility reflect two areas of educational research:

1. Studies devoted to understanding the *cognitive processes* of experts and novices and
2. Analyses of the learning experiences that enhance knowledge *transfer*.

Investigations of the differences between the problem-solving capabilities of experts and novices conclude that the disparity between the two groups is not due to just memory and intelligence. The extensive experience of experts affects what they *notice* and how they organize, represent, and interpret information in their area of expertise. The knowledge of experts appears conditionalized by the contextual circumstances of an issue. On the other hand, studies find that novices focus on memorizing, recalling, and rote manipulation of formulas and symbols (John D. Bransford, Ann L. Brown, and Rodney R. Cocking, 2000).

Knowledge transfer is the ability to apply economic principles to novel circumstances and scenarios. Research in the general area of knowledge transfer by Spiro, et al finds that learners are able to comprehend the relevant features of important concepts and ideas better when they are taught in multiple contexts. Exposure to many contextual situations increases the learner's capacity to think flexibly about complex problems and issues.¹

II. Cognitive Flexibility and Case-Based Learning

According to Spiro, et al (R. Spiro, P. Feltovich, M. Jacobson, and R. Coulson, 1995), cognitive flexibility is the "ability to spontaneously restructure one's knowledge in many ways, in adaptive response to radically changing situational demands." That is, in complex environments, learners generally cannot retrieve an intact learning structure from memory; instead the mind combines, recombines, and reinvents structural components to meet the requirements of each particular situation. Thus, knowledge becomes context dependent. Cognitive flexibility theory focuses on learning processes in ill-structured, context-dependent learning environments.

Ill-structured environments are characterized by two properties.

1. Knowledge applications involve interactive, multiple concept structures each of which is individually complex.
2. Across-case irregularities are prevalent; cases or outcomes that appear similar have different conceptual incidence and casual nexuses.

¹ Viewed in the context of Bloom's cognitive pyramid, the issue is how to most effectively achieve level six, *evaluation*. The verbs or actions associated with this level are *use, appraise, judge, recommend, critique, justify, defend and transfer*.

For example, fundamental economic principles that are orderly and regular in the abstract and within the confines of textbook applications may be difficult to apply across varying actual economic scenarios. The present value model used to explain the valuation of financial goods, for instance, is well structured but many of its applications drawn from reality are ill-structured and complex. Securities that appear similar to novices when applying the present value formula may be quite different in underlying fundamentals. To the expert economic analyst these securities would look quite different.

Subject matter ill-structuredness presents serious impediments to mastering conceptual complexity and the ability to transfer knowledge to new situations that are different from the ones posed in lower level economics courses. Spiro, et al contend that these impediments can be overcome by moving from a learning process that emphasizes the retrieval from memory of intact preceding knowledge to a system that stresses the flexible reassembly of preexisting knowledge to fit the needs of various situations.

The *oversimplifications* and polar cases used to introduce and emphasize points at the lower levels of the cognitive domain, principles of economics, are impediments to developing higher-level skills. For instance, in well-structured domains compartmentalization of the subject matter can be an important and effective tool. However, in complex environments where interconnectedness permeates the knowledge set, no single analogy or situation will characterize the possible outcomes. This issue seems particularly important for students when dealing with, say, the short-run versus long-run impact of economic variables. Ask your students what the impact of an increase in the money supply is on the level of interest rates. Automatically they will say that rates will fall and in a majority of the cases that is the end of it. This answer represents the analogy or simplification from the basic courses. Focusing on short-run economic events in the early stages of the learning process, while an important mnemonic, seems to produce an oversimplification bias that remains with students as they advance to higher-level domains. Ask your first year graduate students the same question.

Economics is not alone in this respect, Coulson, et al (R.L. Coulson, P.J. Feltovich and R.J. Spiro, 1997) discovered this reduction bias in studies of medical students.² Diagnosis of hypertension was

² Reduction bias encompasses seven different types of instructional oversimplification (See Spiro, et al, 1988). Jacobson (1991, pp. 20-21) summarizes these oversimplifications as:

- Oversimplifying complex and irregular structures and concepts.

characterized by a centralized mind set (M. Resnick, 1996) that produced common remedial action across different patients even though it was later found that the sources of the hypertension were different and other complications existed. Applying an approach derived from the theory of cognitive flexibility led to different diagnoses among the patients. Two of the patients received the same treatment, one received fewer medicines because the primary problem was addressed directly, and the other patient was treated for a different disorder.

Instruction based on the theory of cognitive flexibility avoids these impediments to learning by stressing the conceptual interrelatedness and partial overlap of concepts among actual cases and experiences. Jonassen, et al (D. Jonassen, D. Dyer, K. Peters, T. Robinson, D. Harvey, M. King, and P. Loughner, 1997) express the application of cognitive flexibility in instruction as reflecting the complexity faced by practitioners in a field rather than focusing on practical, professional problems as mere linear sequences of decisions. The following four points summarize the cognitive flexibility approach to learning.

1. Learning activities must provide multiple representations of content.
2. Instructional materials should avoid oversimplifying the content domain and support context-dependent knowledge.
3. Instruction should be case-based and emphasize knowledge construction, not transmission of information.
4. Knowledge sources should be highly interconnected rather than compartmentalized.

The theory of cognitive flexibility leads to case-based learning. However, it goes beyond the prototype case as an illustration of an abstract concept. Learners must be exposed to many case experiences in order to emphasize the multifaceted nature of complex environments, such as those that arise in the analysis of economic scenarios. But the process really goes beyond just case presentations. The core element of random access instruction is the decomposition of cases into mini-cases in order to highlight their partially overlapping

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- Emphasis on a single basis for mental representation.
 - Centering on hierarchical processing of material.
 - Context-independent conceptual explanations.
 - Reliance on cookbook knowledge structures.
 - Rigid compartmentalization of knowledge components.
 - Passive conveyance of knowledge.

dimensions. That is, the same information or insight can be represented in actual situations or events in lots of different ways. For example, the impact of rising interest rates or taxes on a company's cash flow position can occur in many different contexts. Firms can be highly leveraged, all equity, highly liquid, illiquid, etc. Federal and state environmental policies criss-cross various industrial sectors differently. Considering various aspects of cases (mini-cases) helps the learner to connect common elements of dissimilar situations and to improve the possibility of transferring knowledge to new circumstances or conditions.

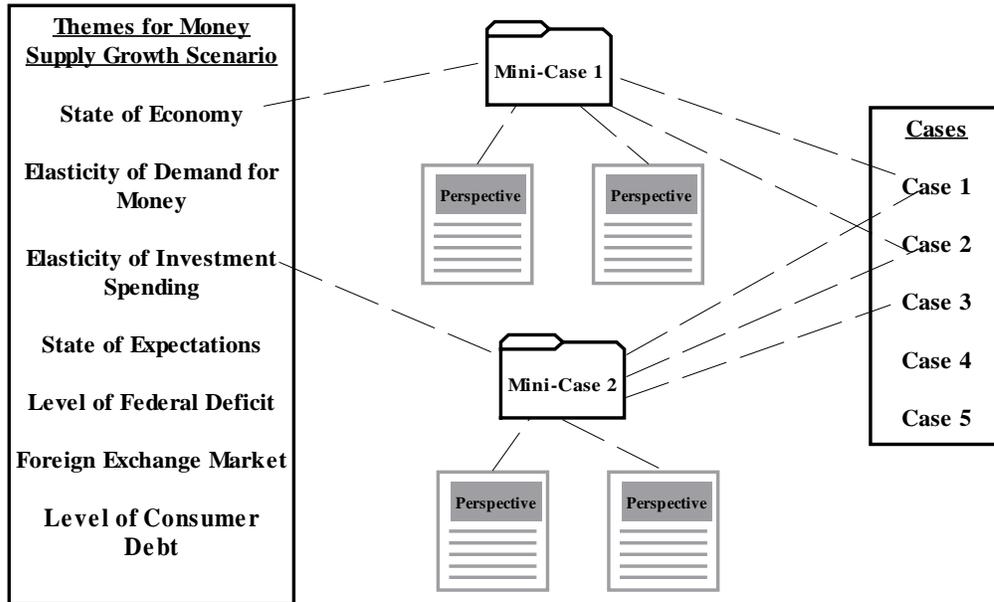
III. Cognitive Flexibility Hypertext

The cognitive flexibility approach to learning seems particularly adaptable to a hypertext design that emphasizes the interrelatedness and interconnectedness of thoughts and ideas. A hypertext approach allows the learner to transverse the multiple themes and perspectives which characterize complex knowledge domains. Cognitive flexibility theory suggests that learners grasp the nature of complexity more readily by being presented with *multiple representations of the same information in different contexts*. By see multiple representations of the same phenomenon learners develop the mental scaffolding necessary for considering novel applications within the knowledge domain. They begin to think about how they recognize and analyze a new situation.

For example, increases in the money supply impact the economy differently depending, on among other things, the stage of the business cycle, elasticity of the demand for money, elasticity of aggregate spending, consumer confidence, short-term and long-term expectations about inflation, and conditions in the foreign exchange market. These are some of the factors an expert in economics would consider in explaining the potential impact of an increase in the money supply on the economy. Experts have considered many cases where an increase in the money supply, a unitary event so to speak, has had a disparate impact on the economy. Experts have thought about these factors but they have also done their metacognitive homework as well. That is, they the have considered how to approach novel situations given the multifarious factors that can impact the final results of an increase in the money supply.

Cognitive flexibility hypertext fosters the development of metacognitive skills by confronting the learner with multiple

representations of case-events.³ Various thematic elements can criss-cross numerous scenarios (cases) that seem quite dissimilar in an overt context but add to the learner's cognitive and metacognitive development. The figure below lists the four structural components identified by cognitive flexibility theory as being important to instructional design.



Cases or Scenarios

The heart of cognitive flexibility is the comprehensive case or scenario. Not one prototypical situation but many wide-ranging cases. As expressed by Spiro et al (R. Spiro, W. Vispoel, and J. Schmitz, 1987), "[I]n ill-structured domains, crucial information tends to be uniquely contained in individual cases – examples are not just nice, they are necessary." As agglomerations of thematic dimensions, cases illustrate the multifarious nature of real life experiences. However, no one case

³ Consider another example of multiple representations, product pipelines. Understandably product pipelines appear different to the novice than to the expert analyst. The novice sees pharmaceutical companies with drug pipelines, auto manufacturers with new car and truck models in the pipeline, and commercial real estate firms with new office buildings and malls in the pipeline. The diversity of the pipelines may cloud the fundamental relationship between a firm's product pipeline and its valuation in the mind of the novice. That is, these situations may seem totally different to the novice when in fact there is a fundamental connection between the product pipeline and the market value of a company. The point is that the novice-learner needs to be exposed to many cases (mini-cases) encompassing firms' product pipelines. In this way, the learner can approach new scenarios involving the valuation of an on-going business in a cognitively flexible way.

applies to all situations. Learners must confront many cases in an effort to understand the complexity of say, monetary acceleration or deceleration, on the economy. Fragments of different cases (experiences) combine to form the basis of a reconstructive reasoning process. The adaptive reassembly of information is important to developing advanced cognitive skills.

Two principles guide the disassemble/ reassemble instructional strategy.

1. The individual cases must be decomposed into their component dimensions or themes.
2. The interconnectedness of the case themes and perspectives must be emphasized so learners can develop pattern recognitions and analogies that are adaptable to new cases.

Focusing on the linkages among the seemingly dissimilar aspects of various cases facilitates the transfer of knowledge to new and unexpected circumstances.

Themes

Themes are ideas expressed by subject experts as possible schema for understanding the complex scenarios being studied by a learner. Constructing a hypertext interface based on cognitive flexibility theory requires the use of multiple themes with the widest possible scope or coverage. In complex, ill-structured domains, no one theme will be the *correct answer* or capture *all* of the dimensions of the situation. Therefore, the focus is on developing a comprehensive set of themes that reflect the best understandings of content experts.

Undoubtedly, thematic dimensions will overlap, however, adding themes increases instructional value as long as the themes are not coincidental. The diagram above lists seven themes that might be used by experts to explain the impact of a change in the rate of money supply growth on the economy. For example, the initial state of the economy influences the impact of acceleration in monetary growth on other economic factors. Experts would predict different outcomes for monetary growth during an inflation period than in a period of general economic slow down. Other aspects experts might consider are the velocity of money, elasticity of aggregate spending, state of expectations, level of federal deficits, foreign exchange markets, and level of consumer debt. Unquestionably there are other themes that can be added to the list. However, this list illustrates the complex

dimensions that would be considered by an expert in viewing a money supply growth scenario.

Mini-Cases

The disassembled units of a case are referred to as mini-cases. Mini-cases are text selections from complete cases or scenarios that encompass particular themes in the cases. The starting point for all instruction in cognitive flexibility hypertext is the mini-case. Learners can focus more readily on the overlapping themes in the various cases by analyzing the mini-cases drawn from the primary case material. Mini-cases are short statements but rich enough in content to allow recognition of a major theme(s) and its relationship to the case. For example, statements about the consumer confidence or the foreign exchange market from different factual monetary growth scenarios represent mini-cases. Mini-cases might be thought of as flash cards, although much richer in content, that reveal themes that are common across the different cases. Within each mini-case learners confront concepts, definitions, methodologies, and issues unique to monetary economics.

Perspectives

Conceptual and semantic elements within a mini-case are referred to as perspectives. As hyperlinks, perspectives provide constant access to the fundamental ideas, concepts, and definitions of monetary economics. Hot words and phrases within a perspective can link to relevant points in other perspectives thus leading to multiple representations of important ideas and concepts.

Jacobson and Archodidou (M. Jacobson and A. Archodidou, 2000) describe this link structure as the *intra-case* and *inter-case* dimensions of knowledge interconnectedness. Intra-case hyperlinks connect basic or surface elements within the individual cases to the abstract or conceptual ideas that provide the learner with deeper understanding of these features. In a sense, intra-case hyperlinks *pull* the learner into the material. There is a tendency for learners to read and react to the surface elements of a case. Intra-case hyperlinks overcome this tendency to some degree by providing the learner with immediate access to deeper explanations of concepts or issues. Inter-case hyperlinks connect the different cases and their mini-case components. Each case has its own textual and linguistic representations and issue scenario. Inter-case hyperlinks tie these elements together across the cases or scenarios. That is, how the

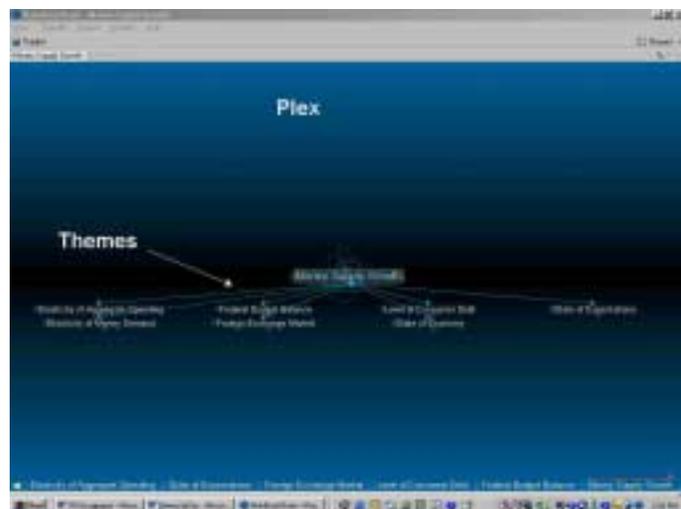
basic concepts and ideas of monetary economics are connected across actual monetary scenarios.

IV. Web Interface

The web interface that best facilitates the implementation of cognitive flexibility hypertext is one emphasizing theme paths rather than a purely hierarchical structure. Hierarchical course structures are useful and improve on unstructured environments, particularly for students just beginning a subject. However, hierarchical menu structures are incapable of expressing the web of associative links that combine to form the subject matter of a course. The idea is to have clusters of information but not necessarily in a hierarchical structure; perhaps a structure more along the lines of the cognitive process of the content developer.

An interface structure meeting these requirements is a knowledge management product, *The Brain*, produced by Natrifical LLC. *The Brain* interface is called the *plex*. The plex houses *The Brain's* thoughts. In this context, thoughts include the information that is the course or topic being considered. Thoughts can be active or inactive at varying points or positions in the plex. Within this structure any piece of information can be associated with and visually linked to any other piece of information.

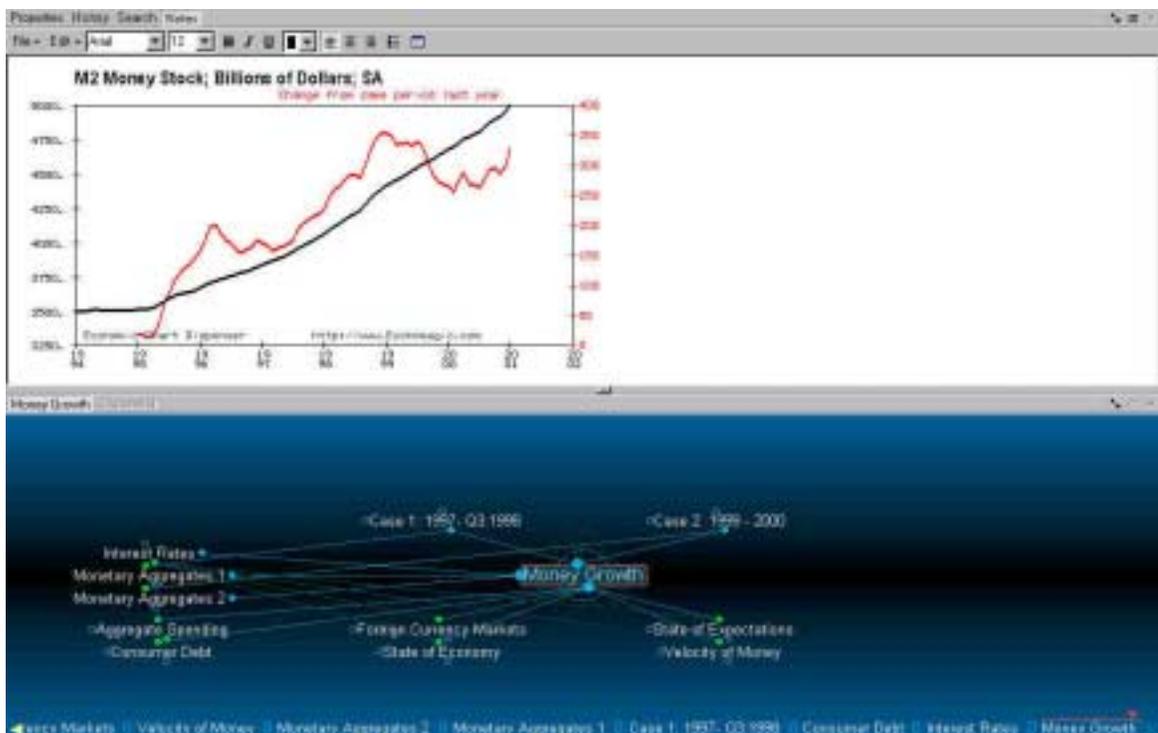
What this means in terms of course or topic design is that the content structure can follow the cognitive framework or associative path of its designer and that the students can visualize the course or topic in its entirety. In the context of the cognitive flexibility approach to learning, the case themes become parent thoughts and mini-cases become child thoughts. Perspectives can be categorized as jump thoughts and hyperlinks. Each thought is linked through three *gates*. The gates are symbolized as circles. There is one circle for each



of the thought categories: parent, child, and jump. Hollow gates have no links to other thoughts. Solid gates reveal linkages.

The center of The Brain's plex is the "active thought". Within the plex, active thoughts are surrounded by other thoughts that are important in the cognitive process of the instructor/designer. Clicking on a thought reconfigures the plex to make the thought active and the focal point of the plex.

For example, the plex shown below is centered on money growth and its concomitant themes. Case 1: 1997- Q3: 1998 and Case 2: 1999 - 2000 are the parent thoughts and the themes represent the child thoughts under the active thought "money growth".

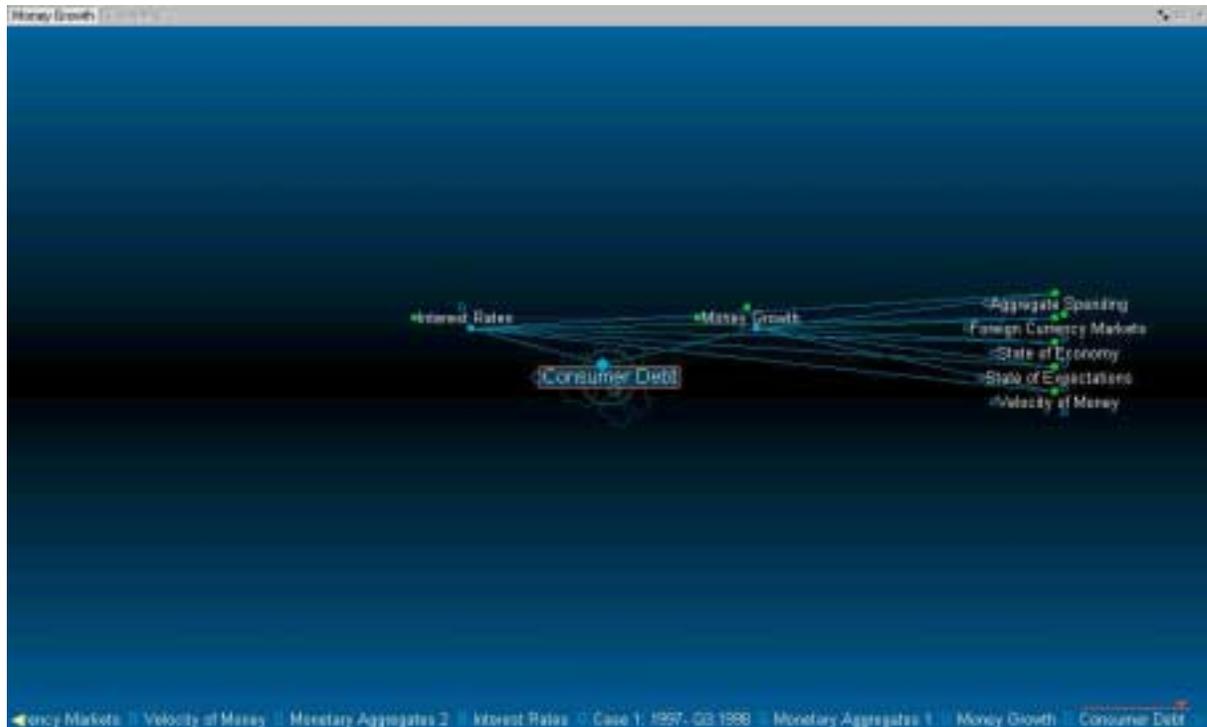


Groups of child thoughts (themes) include sibling thoughts that move to the right center of the plex when a specific child thought becomes active. In this example, the cases are composed of the total text of the Humphrey-Hawkins Reports⁴ for the designated periods. Each case is decomposed into mini-cases based on the particular theme it addresses. Mini-case *perspectives* provide the vehicle for explaining and illustrating abstract concepts within the context of the specific case details. Interest rates, monetary aggregate 1, and monetary

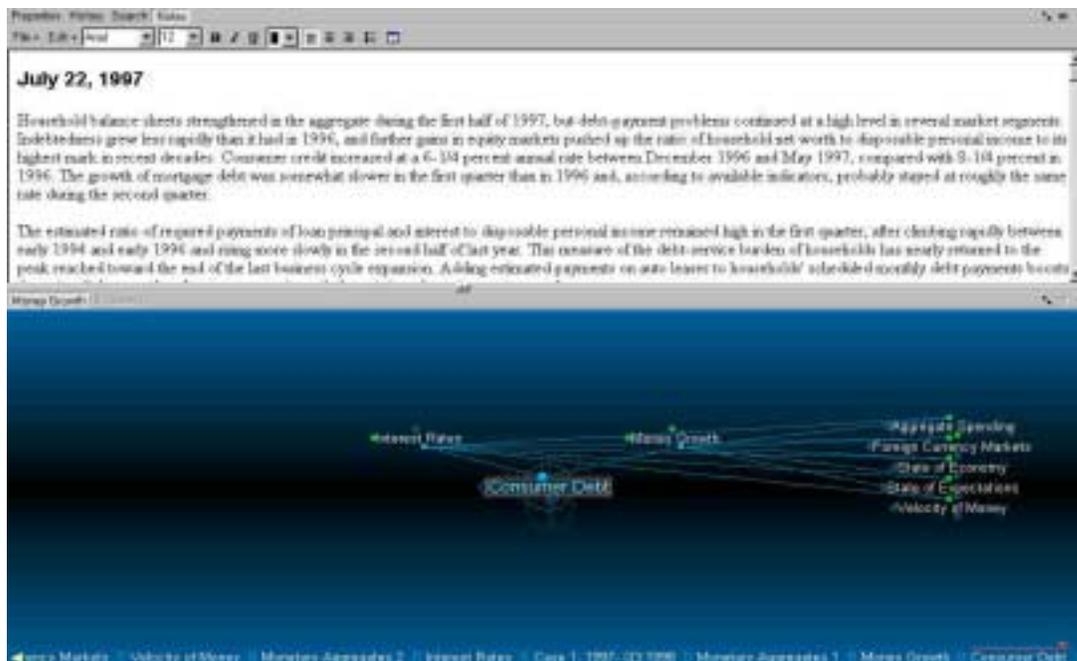
⁴ The actual report dates included July 22, 1997, February 24, 1998, July 21, 1998, July 22, 1999, February 17, 2000, and July 20, 2000.

aggregate 2 are jump thoughts connected to money growth.

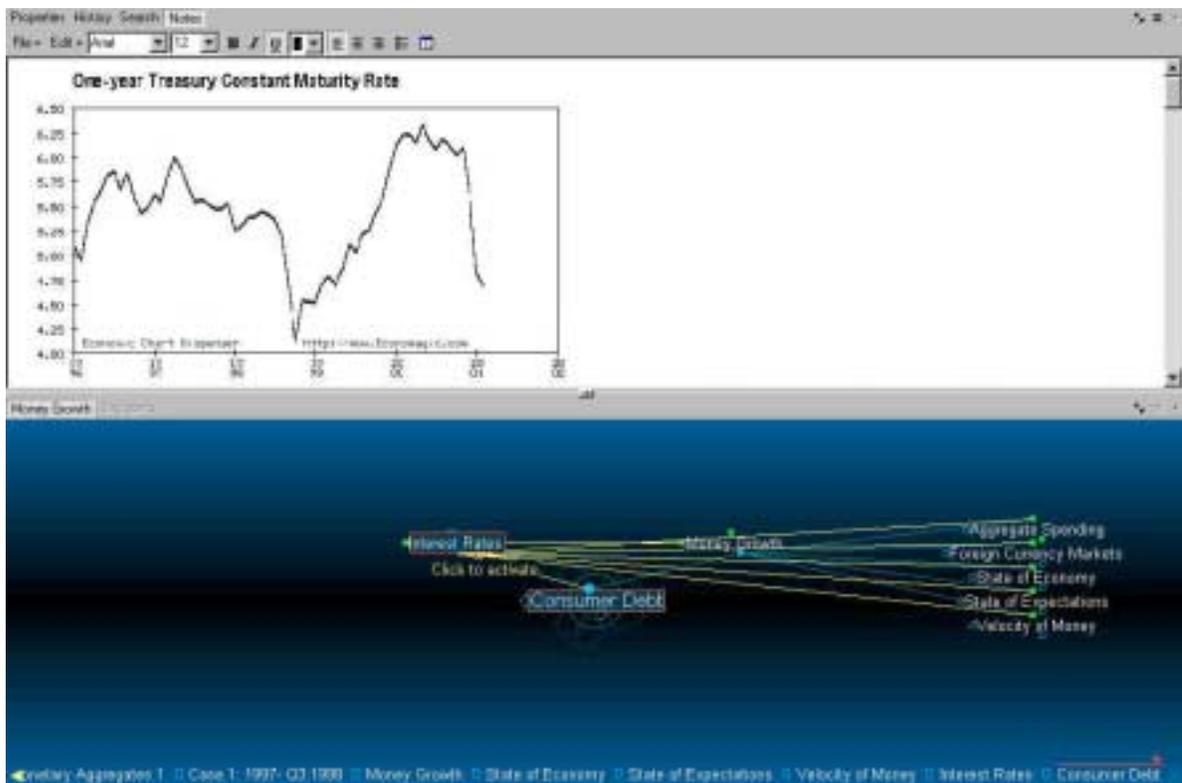
To illustrate the development of the themes, click on consumer debt.



The parent thoughts of consumer debt are interest rates (cost) and money growth (availability). Sibling thoughts of consumer debt are the

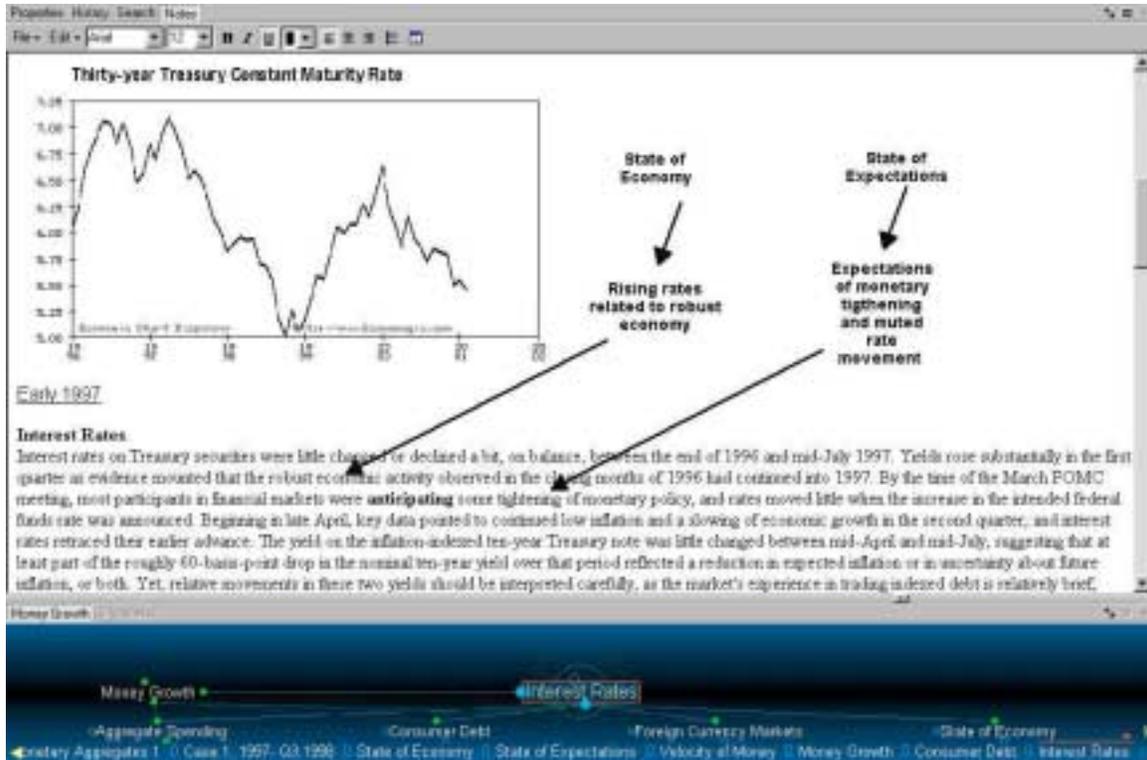


other themes now listed and accessible on the far right of the screen. The links show the cognitive linkages among consumer debt, money growth and the other themes. The theme consumer debt houses the mini-cases from the Humphrey-Hawkins Reports that discuss household sector net worth, indebtedness, and delinquencies. They are chronological chunks of the cases. With consumer debt as still the active thought, suppose the student wants to quickly view the connection between interest rates and the other themes. By moving the cursor to the thought “interest rates” the student will highlight the linkages and see a quick view of the interest rates *Notes*; a term used in *The Brain* for the blank browser screen above the plex.

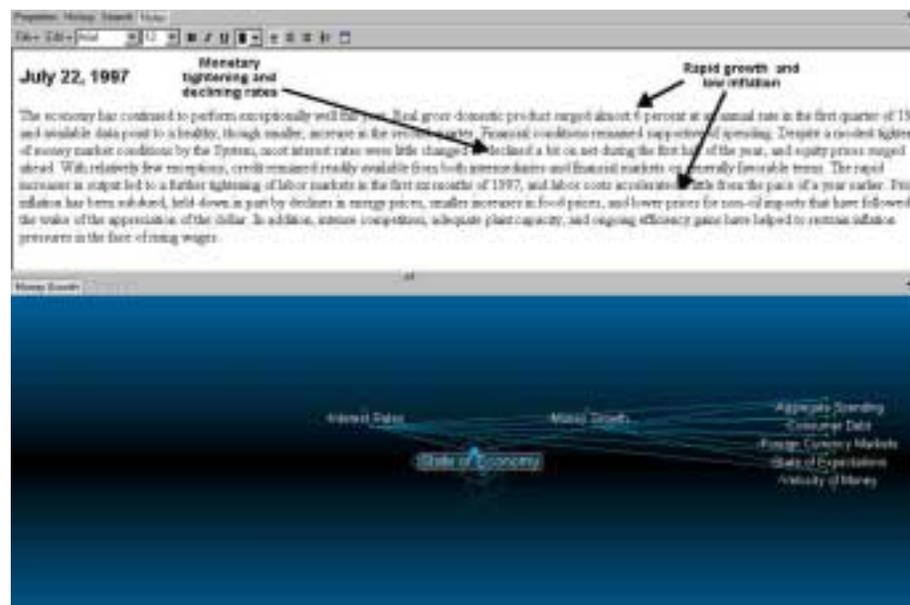


The notes screen includes graphs showing interest rate movements during the case periods and mini-cases relating to interest rate developments. The first mini-case discusses the interrelationships among several of the themes. For example, rate movements are related to the robust state of economic activity. This discussion could trigger the learner to activate this particular theme. In addition, the mini-case focuses on the state of expectation in two different contexts. The first has to do with the markets anticipation of tighter monetary policy and the muted response of market interest rates. Explaining that the market had already discounted the announcement of a more

restrictive policy. The other aspect was a reduction in inflationary expectations that tended to reduce nominal rates even in the face of a more restrictive monetary policy. Downward pressure on yields also occurred because of a reduced supply of Treasury debt.

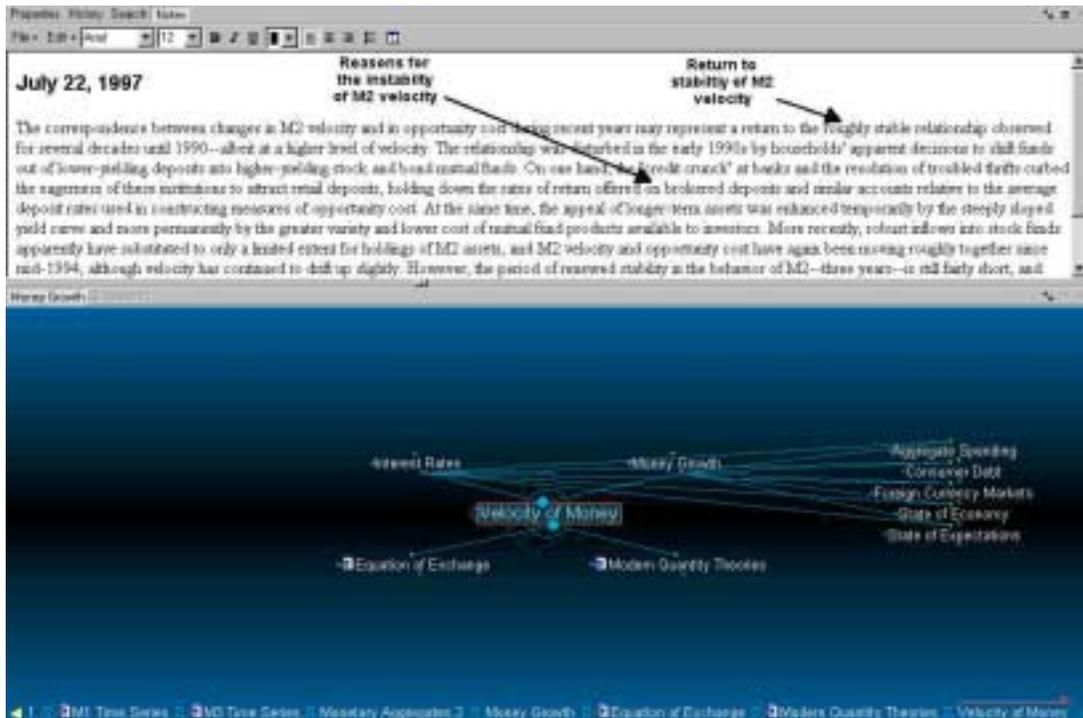


Clicking on the state of the economy the student see another mini-case for this period that provides insights into growth of aggregate output and why actual and expected inflation remained low. In this period



modest monetary tightening was associated with constant or declining market yields even in the face rapid economic growth.⁵

From the state of the economy thought move to the velocity of money by activating its thought at the bottom right of the sibling list.

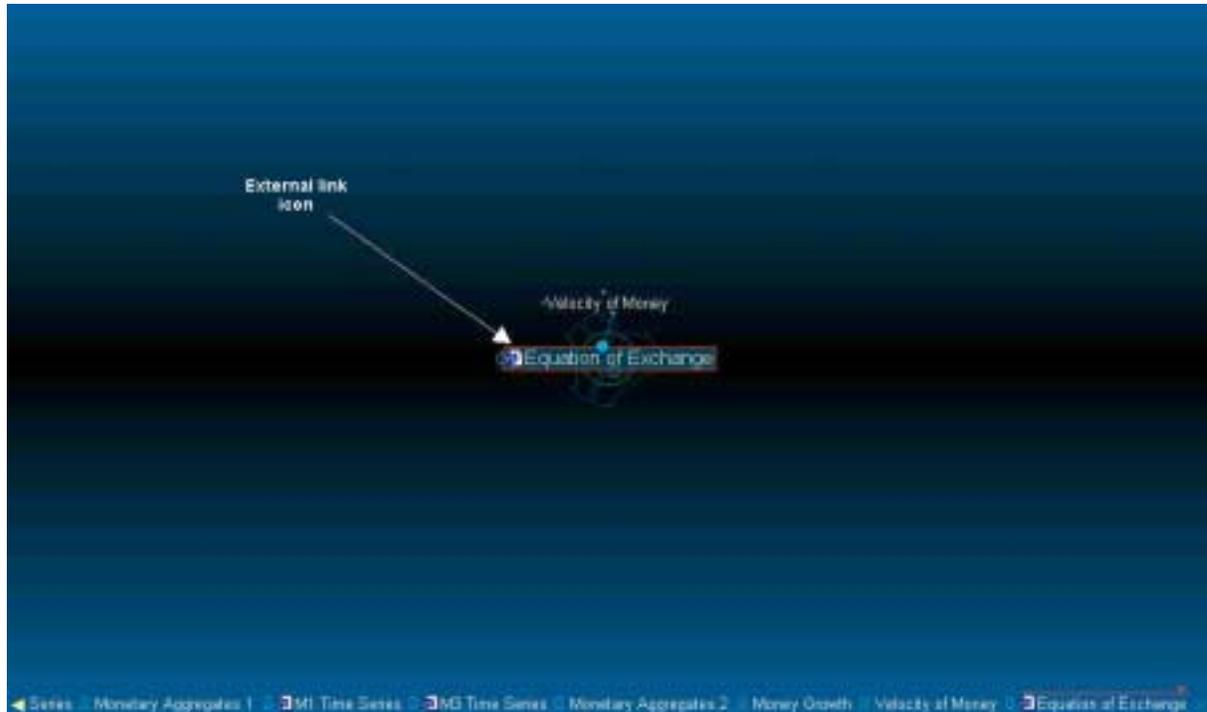


The first mini-case discusses the return of stability to the M2 velocity of money and the reasons for its instability in the early years of the decade. The mini-case highlights the relationship between the opportunity cost of holding money and its velocity. At this point the learner may want more information about the relationship between velocity and other aggregate economic variables.

The learner could click on the equation of exchange. In this case the icon embedded in the thought means that there is a hyperlink to an external web page discussing the topic of the thought. Double click the icon and a page appears that provides a detailed review of the various versions of the equation of exchange. Modern quantity theories is another perspective that discusses the relationship between velocity and the opportunity cost of money in the Cambridge cash balance equation and Friedman's approach to the demand for money. The

⁵ The mini-cases are more than just statements of fact because each has a context of its own plus being part of the larger case.

learner is led into the theory through the perspectives in the mini-cases. The point is that the theory is brought into the context of the discussion through the actual monetary scenarios.



VII. The Equation of Exchange

The equation of exchange is a relationship between the money supply (M) and the value of transactions (PQ) created by its velocity or circulation (V). When people spend more, velocity goes up. When people spend less, velocity goes down.

The Equation of Exchange as an Identity

An identity is a representation of a relationship where both sides are perfectly equal because they have been defined in such a way to be equal. Each side carries equal weight. Neither side is dominant. It does not indicate cause and effect. When one side changes, the other side changes, but nothing in an identity indicates which side will actively change and which side will passively respond. As an identity, the equation of exchange states that effective aggregate demand must equal aggregate supply, or, more simply stated, the sum of all purchases must equal the sum of all sales.

Transactions Version of the Equation of Exchange: The Transactions Version of the Equation of Exchange explains how the supply of money balances, circulating through the economy, generates an equal and offsetting volume of nominal transactions:

$$M_t V_t = P T_t$$

where M_t is the supply of money balances, V_t is the velocity or rate of circulation of these money balances, P is the general level of prices of all transactions, and T is the number of transactions.

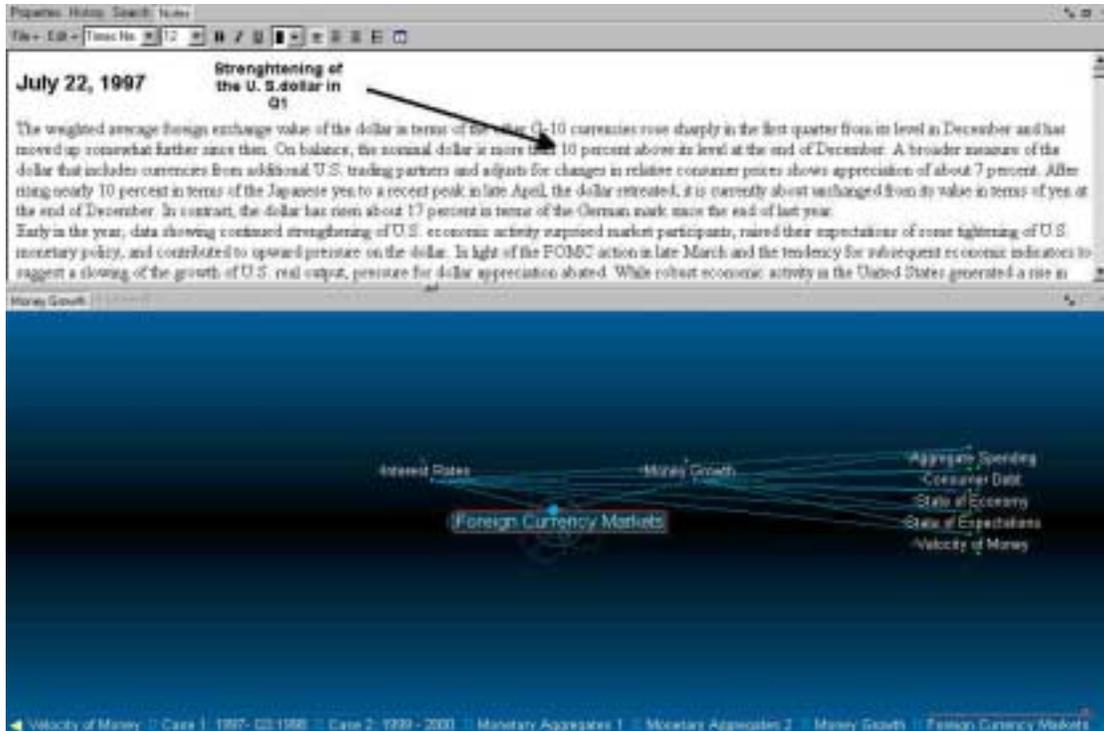
Income Version of the Equation of Exchange: The Income Version of the Equation of Exchange shows how the supply of money balances, circulating through the economy to buy newly produced final goods and services, generates an equal and offsetting volume of income for the factors of production:

$$M_t V_y = P Q = Y_t$$

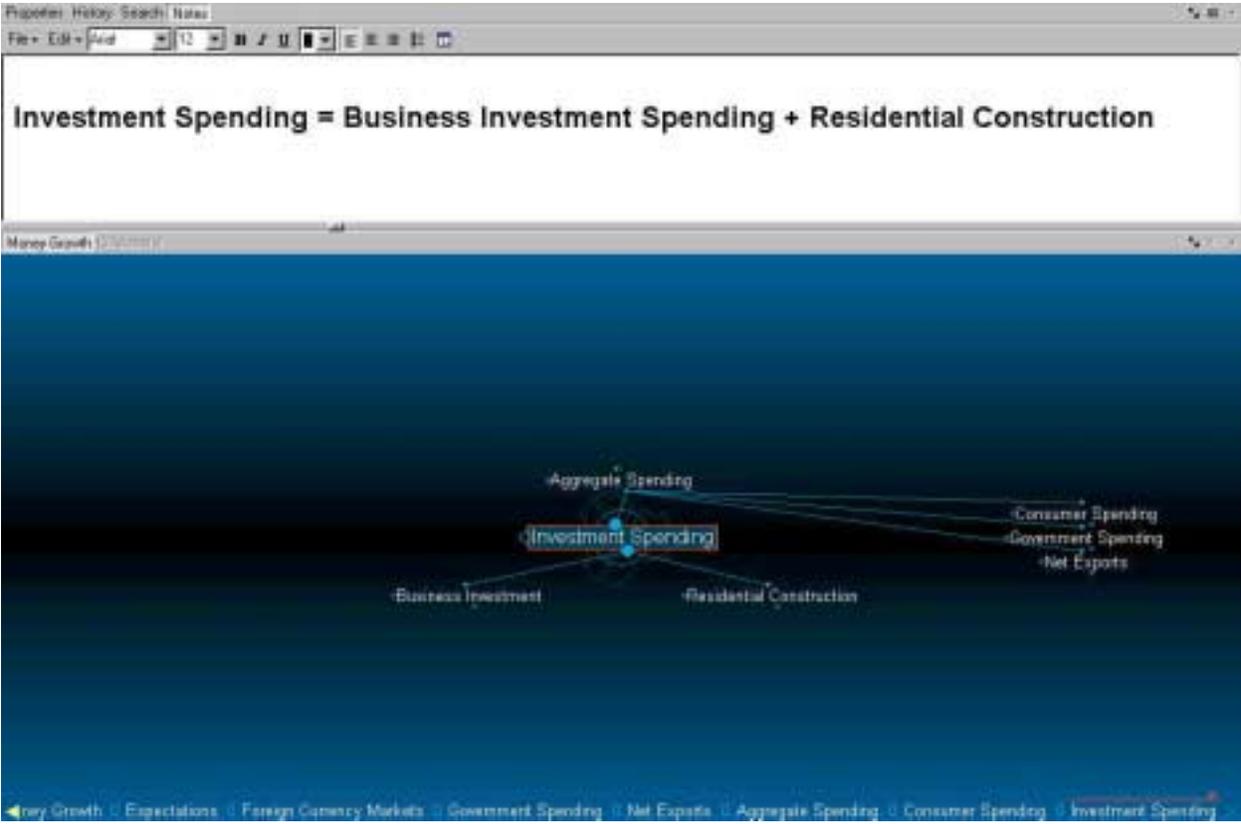
where V_y is the income velocity of money balances, Q is the volume of real output of newly produced final goods and services, and Y is nominal income paid to the factors of production. Since GNI includes only transactions for newly produced final goods and services, the money supply so circulating yields GNP (= PQ), where Q is the

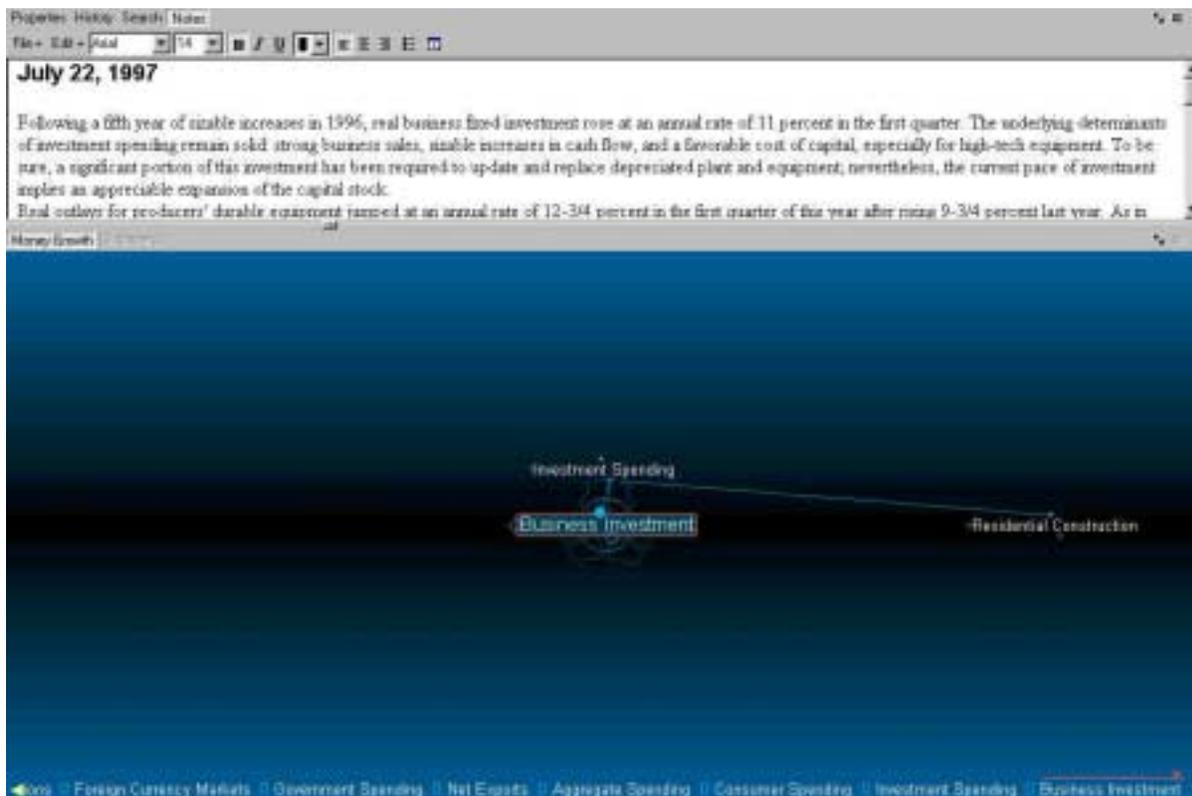
COMPARISON OF THE TRANSACTIONS VERSION WITH THE INCOME VERSION			
Transactions Version		Income Version	
$M_t V_t = P T$		$M_t V_y = P Q$	
All transactions:	Final goods and services	Gross National Product (GNP)	GNP =
	intermediate goods	Total market value of all newly produced final goods	

Currency market expectations are highlighted in the first mini-case in the “foreign currency market thought”. During the period covered by the mini-case the U.S. dollar appreciated against most major currencies. The source of this appreciation was an **unexpected** strengthening of U.S. economy that surprised market participants, leading them to anticipate some tightening of U.S. monetary policy, and contributing to upward pressure on the dollar.



Click on aggregate spending to view its components. The parent thought, “aggregate spending”, is separated into four child thoughts: consumption spending, investment spending, government spending, and net exports. Each of these thoughts has its own child thoughts that are evident when they are activated. For example, if the “investment spending thought” is activated then its components, business investment and residential construction, appear as child thoughts in the plex. Activating business investment reveals the mini-cases for this thought.





Transferability involves the reconfiguration of knowledge by the learner in response to being confronted with novel facts or a new situation.⁶ [Jacobson, 1991] The primary goal of the cognitive flexibility approach is to enhance the learners capability to flexibly reassemble the thematic dimensions in novel situations. Moreover, measurement of this result provides a basis for a transfer-oriented assessment of learning.

As an example, three transfer scenarios are included under the theme, state of expectations. Each of these scenarios was taken from a Humphrey-Hawkins report other than the ones included as the basic cases in this example. Each transfer scenario is connected to the other scenarios as a jump thought for ease of moving between the multiple representations in these exercises.

The situation illustrated in Transfer Scenario 4b brings up the concept of core inflation and its implications for monetary policy decisions. A conceptual perspective on the definition of core inflation is included in this thought as an external link. For this scenario the actual decision of the FOMC is included as a child thought.

⁶ Jacobson distinguishes between *learning* – the ability to repeat previously performed task – and *transfer* – the performance of a task that differs from one's previous experience. In the context of this paper learning would involve a discussion of the thematic dimensions of the mini-cases derived from the two primary cases. Transfer is discovering and relating the thematic dimensions of a new mini-case; that is, a mini-case from Humphrey-Hawkins reports for a different time periods.

Properties History Search Notes

File Edit Print

July 22, 1997

Since the February report on monetary policy, Federal Reserve policymakers have revised upward their **expectations** for growth of real activity in 1997 and trimmed their forecasts of inflation.

If velocities change little over the next year and a half, Committee members' **expectations** of nominal GDP growth in 1997 and 1998 imply that M2 and M3 will likely finish around the upper boundaries of their respective ranges each year. The debt of the domestic nonfinancial sectors is expected to remain near the middle of its range this year and next.

Finally, an extended period of relatively low and steady inflation has reinforced a belief among households and businesses that the trend of inflation should remain

Money Growth

Transfer Scenarios

Interest Rates

Money Growth

Aggregate Spending

Consumer Debt

Foreign Currency Markets

State of Economy

Velocity of Money

Transfer Scenario 4a

Transfer Scenario 4b

Transfer Scenario 4c

State of Expectations

Monetary Policy Decisions

Transfer Scenarios 4b

Aggregate Spending

State of Economy

Case 1, 1997-03 1998

Money Growth

State of Expectations

Properties History Search Notes

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Although **core inflation** measures were at most only creeping up, the Committee felt that there was some risk that the increase in energy prices, which was lasting longer than had seemed likely earlier in the year, would start to leave an imprint on business costs and longer-run inflation expectations, posing the risk that core inflation rates could rise more substantially.

After reading this scenario discussion its implications for the posture of monetary policy at this time.

Money Growth

Core Inflation Hyperlink

State of Expectations

Transfer Scenario 4a

Transfer Scenario 4c

Transfer Scenario 4b

Monetary Policy Decision

Monetary Policy Decisions

Aggregate Spending

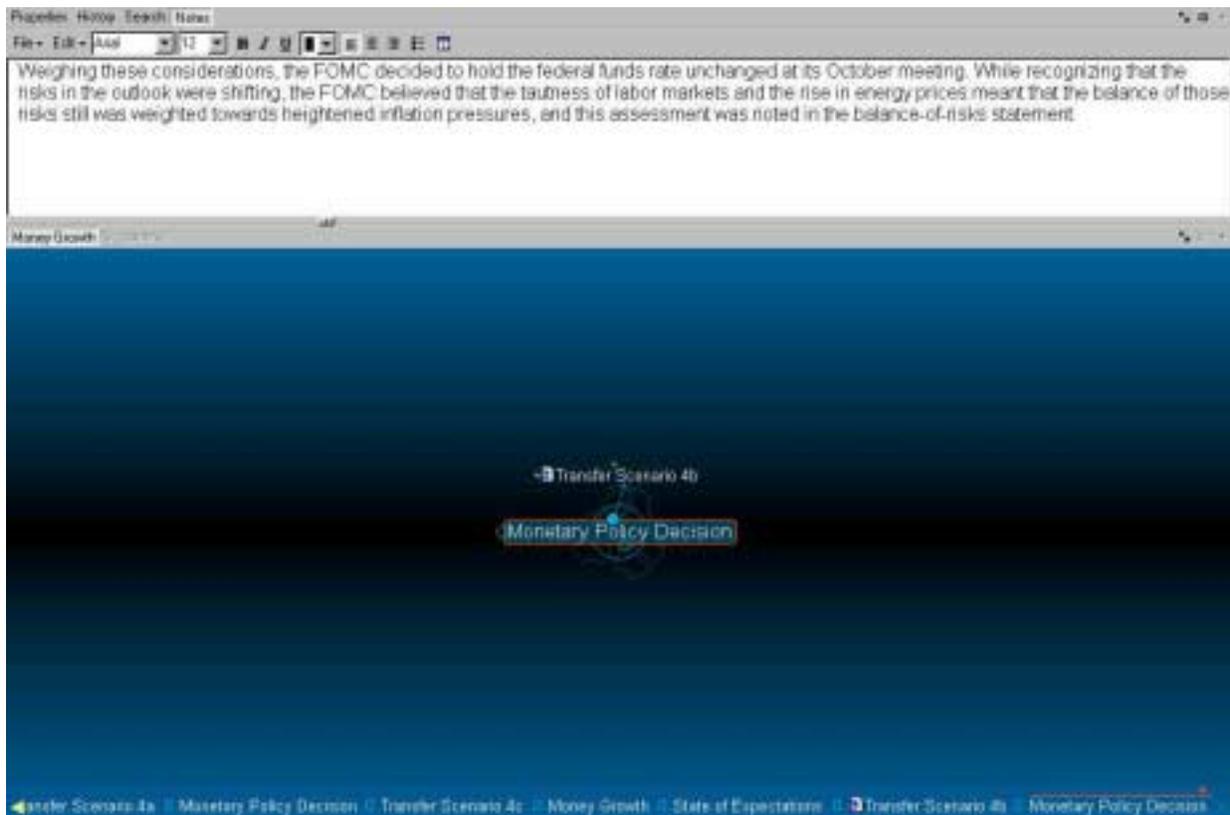
State of Economy

Case 1, 1997-03 1998

Money Growth

State of Expectations

Transfer Scenarios 4b



V. Conclusions

Cognitive flexibility theory highlights case analysis. However, the focus is really on experiences in analyzing the particular thematic dimensions that define the topic being discussed; in this case one aspect of monetary economics. Cognitive flexibility theory emphasizes multiple representations of thematic dimensions and connectivity among important case elements. These aspects lend themselves well to a hypertext instructional environment. This type of interface allows the learner to proceed through different levels of the material by starting or moving to any point in the *thought process*. Flexibility is enhanced over the hierarchical structure that forces the learner to proceed in a linear fashion. *The Brain* interface facilitates random access instructional design, a hallmark of cognitive flexibility theory. Random access in this context means using knowledge flexibly; that is, developing understandings without having to proceed through a sequential retrieval process from its inception.

VI. References

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APPENDIX

IDENTIFICATION OF CASE THEMES

<u>Themes</u>	<u>Identification of Themes</u>
Initial State of Economy	Income effect; reverse-causation; stage of business cycle.
Velocity of Money	Stability of demand for money; interest elasticity of money demand.
Aggregate Spending	Consumption, investment, government, and net export spending; components of spending categories: e.g., business investment, residential construction, durable and nondurable goods, exports, imports; discretionary and mandatory.
State of Expectations	Short-run and long-run expectations about inflation, profitability of capital; government policies.
Federal Deficit	Level of federal deficit; expected growth rate of deficit.
Consumer Debt	Household sector financing; level of indebtedness; delinquencies; mortgage debt; credit card debt.
Foreign Currency Market	Expected exchange movements; market volatility; foreign real interest rates.

MINI-CASE CONTENT AND THEMATIC COMMENTARIES

The excerpt below illustrates the crisscrossing of themes within a mini-case.

Case 1: 1997 – Q3 1998

Mini-Case

February 24, 1998

Even though the Committee kept the nominal federal funds rate unchanged, it saw the rise in the real funds rate resulting from declining inflation *expectations*, together with the increase in the exchange value of the dollar, as providing some measure of additional restraint against the possible emergence of greater inflation pressures. These decreases were due in part to an international flight to the safe haven of dollar assets, but they also reflected *expectations* that these difficulties would exert a moderating influence on the growth of aggregate demand and inflation in the United States

Perhaps most important, as the low level of inflation that has prevailed in recent years gets built into wage agreements, other contracts, and individuals' inflation *expectations*, it will provide an inertial force helping sustain the favorable price performance for a time.

Survey data on inflation *expectations* mostly showed moderate reductions during 1997 in respondents' views of the future rate of price increase, and some of the survey data for early 1998 have shown a more noticeable downward shift in inflation *expectations*. A lowering of inflation expectations has long been viewed as an essential ingredient in the pursuit of price stability, and the recent data are a sign that progress is still being made in that regard.

Survey measures of expectations for longer-horizon inflation generally did move lower last year, but by less than the drop in nominal yields.

As a result, estimates of the real longer-term interest rate calculated by subtracting these measures of expected inflation from nominal yields indicate a slight decline in real rates over the year.

Valuations seemed already to have incorporated very robust earnings growth, and in October, deepening difficulties in Asia evidently led investors to lower their *expectations* for the earnings of some U.S. firms, particularly high-technology firms and money center banks.

Despite the strong performance of earnings and the slower rise of stock prices since last summer, valuations seem to reflect a combination of *expectations* of quite rapid future earnings growth and a historically small risk premium on equities

Survey estimates of stock analysts' *expectations* of long-term nominal earnings growth are, in fact, the highest observed in the fifteen years for which these data are available. Because inflation has trended down over the past fifteen years, the implicit forecast of the growth in real earnings departs even further from past forecasts.

German long-term rates have also fallen about 80 basis points as expectations of tightening by the Bundesbank diminished, especially toward the end of the year

Downward adjustment of expectations of inflation in the industrial countries in general may have added to the selling pressure on gold.

Thematic Commentaries

1. State of expectations

a. Declining short-run inflationary expectations [2a and 3a]

- 1) Selling pressure on gold

b. Declining long-run inflationary expectations [2a and 3a]

- 1) Lower expectations built in to wage contracts
- 2) Lower individual expectations
- 3) Meeting the goal of price stability

c. Lower earnings expectations [2a]

2. Aggregate spending

a. Moderation in the growth aggregate spending [1a and 1b]

- 1) International crisis
- 2) Lowering earnings (profit) expectations [1a, 1b and 3a]

3. Currency markets

a. Appreciation of the U.S. dollar

- 1) International crisis [2a1]

b. Lower German interest rates [3a]

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d. Declining short-run inflationary expectations [2a and 3a]
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2. Aggregate spending

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1) International crisis [2a1]

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