A System Dynamics Approach to Jurisdictional Conflict between a Major and a Minor Healthcare Profession

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Introduction:

A myriad of theories and perspectives have emerged from the study of professions. On the one hand, the notion exists that blue collar laborers are increasingly becoming professionalized (Foote 1953), and on the other hand there is the perception that as technology and information systems move forward, a specialized system of knowledge may no longer be sufficient justification for an exclusive right to work and exalted status, for any occupational group (Morgall and Almardottir 1999). Amidst these contrasting world views is the perspective of a hierarchical division of the professions themselves. Glazer (1974) theorized that there are only two major professions: law and medicine. All the rest, if they can be considered professions at all, are minor. This paper speaks to the hierarchical disparity in the status and control of expert labor, with particular, interest in the notion of inter-professional struggle between higher and lower ranked groups. The work is informed by Abbott's seminal work (1988), suggesting that professions struggle to create, secure and protect jurisdictional boundaries co-opted from other players who struggle to maintain and grow their own exclusive claims. The research question is: What strategies can a minor profession employ to successfully gain market share when jurisdictions between major and minor players overlap?

Historically professions have been granted exalted status based on a dual claim of expert knowledge (Hughes 1963) and altruistic worldview (Habenstein 1963). However,

as human beings, the members of professions and professional organizations are motivated by the same self-interest forces that propel affiliates of other social classes (Miller, Grodeland, and Koshechkina 2000; May 1997). Thus, while desirable characteristics and cultural forces have granted the major professions effective economic monopolies (Larson 1977), one must ask if this form of power is in the best interest of society. As argued by Shaked and Sutton (1981), the policy-maker's dilemma, is whether professions should be permitted to retain such economic control. As the impulses of economic, rational man push members of professions to lobby for and defend market control, policy makers concern themselves with issues of cost control and coverage of services – even if the result is competition between professions.

The situation for professions is further complicated by dramatic increases in expert knowledge contained both within the profession and readily accessible outside of it. Changes in the way the public views expert knowledge has resulted from the institution of and advances in the Internet.

Nowhere is this more apparent than in healthcare. Hardey (1999), for example, reported on a qualitative study of Internet users from a set of e-mail lists. He concluded that the Internet was transforming the relationship between medical professionals and patients in several important ways. Hardey found that subjects surveyed preferred Internet health materials to asking their doctors questions for health concerns they found embarrassing, and in order to deal with time constraints. The Internet enabled more comprehensive, unhurried explorations of patient concerns. In addition, subjects in this study reported discovering alternatives to medical care that they considered worthy of pursuit. Despite evidence of contradictory information on the Web, subjects felt capable

of making appropriate decisions for themselves regarding their healthcare. Hardey points out that the response from medicine has been an attack on the quality of alternatives that patients are exposed to.

On the other hand, authors such as Twaddle (1996) view the explosion of knowledge as resulting in increasing complexity and requiring greater use of professional expertise in the professional-client relationship. Speaking particularly about medicine in the United States, Twaddle suggested that communication between physicians and patients is deteriorating as the gap in the use of language between doctors and patients widens, and the two groups are alienated from one another. It is his belief that resultant public dissatisfaction manifests itself in increased malpractice litigation and a search for alternate more "humane" care. Regardless of which perspective is correct (Shaked and Sutton, Hardey or Twaddle) the end result is the same. At this juncture, the dominant healthcare profession (medicine) appears to be losing control, opening the door for stronger inter-professional competition.

As the autonomy of dominant professions is eroded and relations between these professions and their clients change, competitors can expect to create a stronger presence in the marketplace. Few investigators have studied the factors that are likely to be involved in those competitions, and how they may promote specific outcomes, as thoroughly as Andrew Abbott (1988).

Abbott's premise is that academic abstract knowledge is central to the means by which professions barter with each other and with their publics, for territorial control. While acknowledging that conflict between professions occurs within an institutional context that must be considered, Abbott's work emphasizes inter-professional dispute

bounded by the characteristics around the professions themselves. His emphasis on the conflict over rights to the same work between two opposing groups sets him apart from many professional theorists. Abbott defines for the readers a variety of sources that he believes are related to settlement in favor of one profession or the other. In addition to credible academic/abstract knowledge, these include labor supply and association membership.

Three hypotheses, extending from the research question and consistent with Abbott's theoretical approach of an internally bounded system, were considered for study. The first two represent strategies or policies that a minor profession might employ to gain or secure market share control.

The first hypothesis deals with the impact of academic/abstract knowledge. It was hypothesized that an increase in the academic abstract knowledge base of a minor profession would result in an increase in jurisdictional control favoring that profession.

The second hypothesis concerns the relative strength of the professional associations. It was posited that a minor profession with a strong association (as defined by percentage membership) would be more effective at marshalling available resources to its advantage, thus securing a larger client base.

The struggle between professions, however, is not limited to the strategies of the minor profession. Abbott (1988) notes that a dominant profession will fight to maintain its turf, and may annex territory from a minor profession when economically compelled to do so. The third hypothesis speaks to this issue and involves changes in the supply of the dominant profession. Based on Abbott it was predicted that an oversupply of

professionals in the major group would disadvantage a weaker profession in a contest for the same clientele.

One final hypothesis was considered in order to take into account external factors beyond the control of either profession involved in a jurisdictional dispute. In this fourth hypothesis it was predicted that increased pressure from external sources impacting a dominant player would result in increased pressure on the contesting profession with consequent erosion of the minor profession's market share.

A case study approach was used to explore these hypotheses. A System Dynamics model (Forrester 1968; Sterman 2000) was created, whereby the theoretical relationships proposed by Abbott and data collected were combined to test the alternate strategies hypothesized to impact outcome. The unit of analysis is at the level of "profession," and the two professions chosen were medicine and chiropractic.

Medicine was chosen because the work of Hardey (1999), Twaddle (1996), Inglehart (1998) and others (Donelan et al. 1997; Caronna 2004; Light 2004) suggest that it has entered into a time of transition, whereby the exclusivity of its claim to various complaints and concerns may be at an end. Although it fits Glazer's (1974) definition of a minor profession, chiropractic was chosen because it is not a subordinate profession, and has historically withstood the pressures expended against it by medicine. It has gained at least limited prestige in the United States public arena and is the most popular form of complementary or alternative medicine (CAM) used in the United States today (Kaptchuk and Eisenberg 1998). It is often the proxy when complementary and alternative practices are studied in contrast to medicine (Scott et al. 2000; Winnick 2006) and is thus considered a viable competitor to mainstream medicine, for control of at least

a portion of medicine's jurisdiction in American healthcare. In particular, the competition between chiropractic,(minor profession) and medicine, (a major profession), over spine-related conservative care of neck and/or back complaints is investigated.

It is understood that no single case investigation can hope to thoroughly evaluate a theory as rich and complex as that put forward by Abbott, and that is not the intent of this study. Rather, this investigation examined the impact of and relationships between variables of theoretical interest as the contest between medicine and chiropractic is decided. In that process, simplifying assumptions were inevitably made. However, much as the assumption of rational choice continues to be used in economic and policy analysis today (Dugan, LaFree, and Piquero 2005), minimizing theoretical complexity affords the opportunity to thoroughly study central ideas that can later be expanded into more complex scenarios.

The study period involved a 41 year timeframe that has been described as the "Golden Age" (Casalino 2004) where dramatic changes have been observed among organizational groups interacting in healthcare. From an institutional perspective (Scott et al. 2000; Caronna 2004), it is considered to begin at the end of the era of professional dominance (1945-65), move through the eras of federal involvement (1966-1982) and managerial control and market mechanisms (1983-95) and expand into a new era where managed care is rejected and patient protection concerns are pitted against corporate controls. The beginning of the timeframe coincides with the first abstract in neck and back pain available in Medline in 1963. The model is built using System Dynamics methods (Sterman 2000) in the Vensim® Professional for Windows version 5.5c simulation environment.

Model Formulation:

Workplace Sector – Supply/Demand

There are a variety of elements that comprise the workplace sector. These include the roles played by actual providers in given clinical situations as well as the overlap in roles that necessarily occurs to accomplish daily tasks (Abbott 1988). The degree to which these may become blurred is integrally related to the concepts of supply and demand.

Abbott described three scenarios that can be attributed to labor supply/demand conflicts in a jurisdictional dispute. The first he refers to as an "excess jurisdiction." (p. 250) This can be thought of as too little labor supply to meet current demands. In this situation, the incumbent profession is presumed to have more jurisdiction than its labor force can adequately handle. Abbott suggests that if the problem is simply one of too few numbers for the incumbent, the prognosis for the invader is poor, since the incumbent's numbers can be increased and with its cultural authority intact, retribution against the invader may be substantial. On the other hand, if the problem is one where the incumbent has a qualitatively increased jurisdiction – that is, one where increasingly varied abstractions exist as a result of market changes or other systemic effects, then the invader has greater opportunity since cultural authority can be fought for in conjunction with jurisdictional control.

The second is the problem of too large a labor supply for the current jurisdiction. In this situation, the incumbent is likely to try to annex areas either by assuming new work, or by taking control of work currently provided by others who had assumed provider roles during times of labor shortage. Overabundance in the supply of doctors in

the latter half of the 19th century and early into the 20th century resulted in price wars between physicians and other disciplines as medical doctors had to fight for patients in the midst of practitioners who were less likely to harm them (Light 2004). Abbott observed that during times of oversupply in medicine, the profession has had a history abolishing other groups involved in healthcare (p. 250). This tendency is also described by Light (2004) who provides several examples of this when he speaks to medicine's campaign of "eliminating sects" in the early 1900's. For example, midwifery was essentially eradicated by accusations that these professionals were dangerous and uneducated, despite data indicating otherwise (Dawley 2001; Devitt 1979a; Devitt 1979b; Dawley 2000).

The third conflict is created when one profession aspires to annex jurisdictional control by providing services at a lower cost. This conflict can be seen in the growth of nurse practitioners and physician assistants who are called upon regularly today as less expensive gatekeepers in the system (Roblin et al. 2004).

Actual data for the supply of practitioners in each profession is taken from the Statistical Abstract of the United States (1965-2003/4) and AMA data (courtesy of AMA Archives, December 2005). The number of medical physicians per capita has doubled over the past 41 years, suggesting that medicine may have reason to annex jurisdiction once again. Given overlapping interests in back and neck pain, it is reasonable to presume that chiropractic is currently a good target. Some evidence concerning the pressures of competition on the basis of supply and jurisdiction already exists. Winnick (Winnick 2006) conducted an investigation of the numbers of medical doctors who define themselves as holistic practitioners. She found that there was a statistically significant

increase in the number of medical doctors calling themselves “holistic” when there was an increased supply of chiropractors in a given area.

On the other hand, although the number of medical doctors is relatively larger and there is reason to expect heightened jurisdictional competition, specialty practices may have resulted in shortages in certain areas of need (Robeznieks 2006). This suggests that a stronger role may be played, in the future, by physician assistants, osteopaths, nurse practitioners and doctors of chiropractic (DC’s) interested in primary care, in the jurisdiction of the underserved community left behind by medicine (Roblin et al. 2004; Smith and Parry 1998). Labor supply then, for both chiropractic and medicine are important to the systems model of the professions described here. During the same timeframe, the number of chiropractors has roughly tripled.

The sectors of the model representing the supply of chiropractors and medical doctors are provided in Figures 1 and 2.

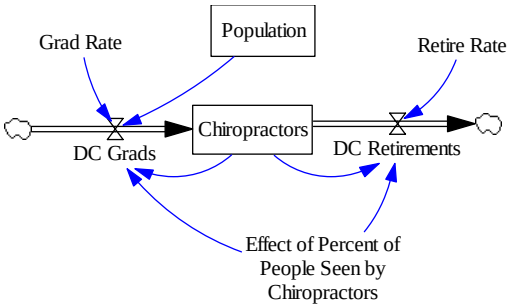
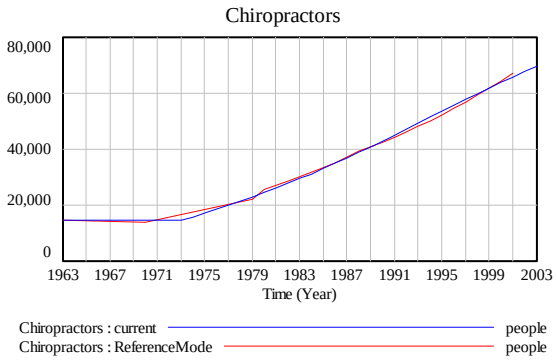


Figure 1. Supply of Chiropractors (DC’s) – Variables and Relationships



*Reference Data: U.S. Census Bureau, Statistical Abstract of the United States: 1965 to 2003-2004

Figure 2. Graph of Actual (Reference Mode) versus Predicted (Current) Data for Supply of Chiropractors

In Figure 1, the rate of new chiropractic graduates is affected by the number of people in the U.S. population who choose chiropractic as a career. The number of

graduates is also influenced by popularity of chiropractic in the public. A larger percentage of people seeing chiropractors results in greater visibility and popularity of the profession and attracts larger numbers of recruits. At the same time, the larger the percentage of people being seen by chiropractors, the more successful practitioners will have been in the field and the greater the job satisfaction. As a result, the number of retirees decreases as the percent of people seeing chiropractors increase. While it could be argued that a smaller number of patients seen by chiropractors may require doctors to postpone their retirement plans until their savings reach a suitable level (Newman 1994), that was not the view taken here (Stanley 1996). The graduation rate and retirement rates are taken as constants. Model output (Current) compared to actual data (Reference Mode), for the Chiropractors stock is provided in Figure 2.

Figure 3 shows the factors in the model influencing the supply of medical doctors. For medicine, the effect of people seen by chiropractors is not taken into account. Since the ratio of medical doctors to chiropractors over the 41 year period of the study averaged almost 16 to 1, it was decided that the effect of the chiropractic market share on the population of medical doctors would be negligible. That is, the impact of the popularity for chiropractors in neck and back pain would not, at this level be expected to be a deterrent to the number of graduates entering the medical community.

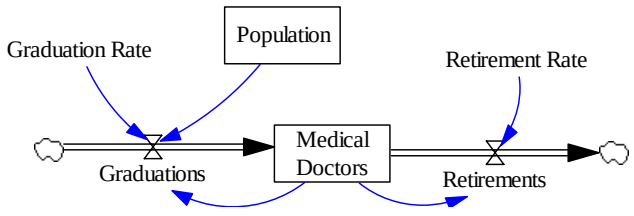


Figure 3: Supply of Medical Doctors – Variables and Relationships

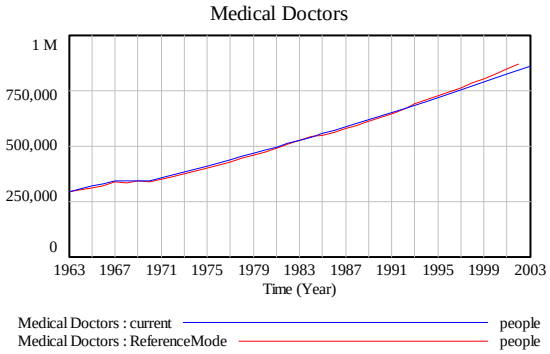


Figure 4. Graph of Actual (Reference Mode) versus Predicted (Current) Data for Supply of Medical Doctors

*Reference data: AMA Data: Copyright: American Medical Association / Courtesy AMA Archives, December 2005

Figure 4 compares the actual (Reference Mode) data on the supply of medical doctors with the modeled data (Current).

Professional Associations Sector

Of the professional associations, Abbott (1988) contends that one national organization that is identifiable to external communities is a requirement for public or legal claim to jurisdiction. In addition, Abbott believes that while less organized professions have the advantage of greater mobility in task assumption, more strongly organized professions with the weight of their membership behind them generally have the ability to support successful competition.

Nowhere are the benefits of strong organization within a profession more apparent than in the rise of the American Medical Association (AMA). Early in its history, the AMA solved its free-rider problem (Olsen 1965) by linking local hospital privileges and malpractice insurance to county level association participation and demanded both local and state participation prior to national level acceptance (Light 2004). Thus the AMA was guaranteed a strong voice even at the local level and began mounting a campaign to eliminate competition, decrease physician supply and work against contract medicine (Light 2004).

With the steady declines in AMA membership over the last 40 years, and the recent resurgence of contract medicine in the form of managed care today, the AMA no longer represents the icon of power that it once did. Decline in association membership has affected both the medical and chiropractic associations at about the same rate (McGregor-Triano 2006). The percentage of memberships held by both medical and chiropractic organizations is today only about 25% in each. Functioning in a more complex environment where fewer solo practices exist in medicine, the medical physician now faces loyalties that go beyond that of their professional association. In addition, since the settlement in favor of chiropractic in the antitrust suit against medicine (1976 – 1987) and the AMA in particular (McAndrews and McAndrews 1995), the association no longer poses the same formidable threat to the chiropractic profession that it once did.

Figures 5 and 6 are graphics of the variables and the relationships pertaining to the number of professionals joining their respective associations. A comparison of modeled to actual (Reference) association members is provided in Figure 7 for the chiropractic profession and Figure 8 for the medical profession.

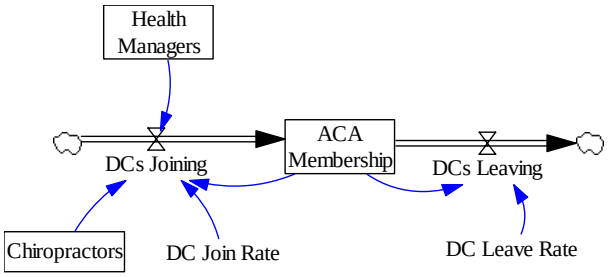


Figure 5. Chiropractic Association (American Chiropractic Association) Variables and Relationships

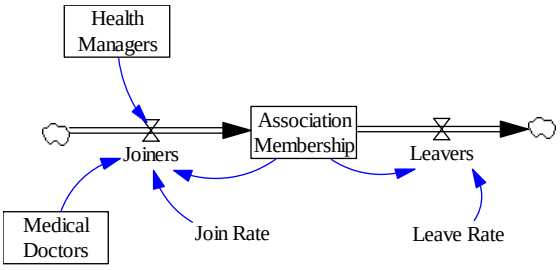
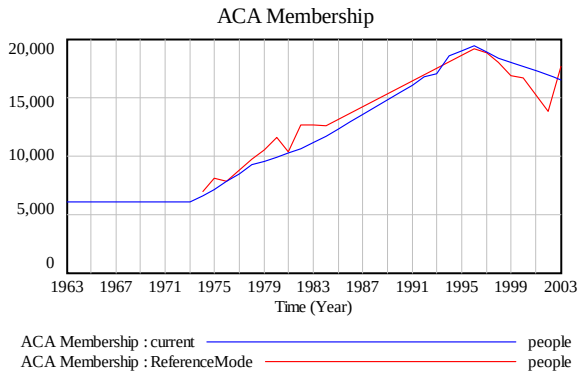
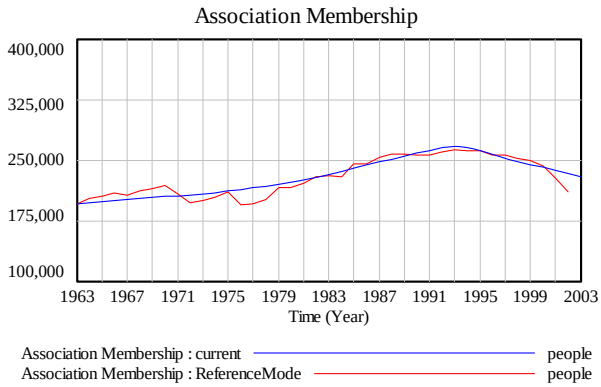


Figure 6. Medical Association (American Medical Association) Variables and Relationships



*Reference Data: Courtesy ACA, December 2005

Figure 7. Graph of Actual (Reference Mode) versus Predicted (Current) Data for Chiropractic Association Membership (ACA Membership)



*Reference Data: Copyright: American Medical Association / Courtesy AMA Archives, December 2005

Figure 8. Graph of Actual (Reference Mode) versus Predicted (Current) Data for Medical Association Membership (Association Membership)

It is expected that the "free rider" syndrome associated with increased numbers of practitioners has affected both groups equally (Olsen 1965). Although the free-rider problem is understood as an issue in any organization, the shape of the raw number membership curves for both professions shows an unexpected increase in membership in the 1980's with declines re-occurring in the latter half of the 1990's. Since the decline in membership has occurred for both groups at approximately the same rate over the same period in time, and the raw numbers show a temporary change in shape for each group, it is suggested that in addition to free rider problems, some external pressure may have existed for both professions during the study period. Looking for potential candidates, it is noted that the rising dominance of commercial interests and managed care (Casalino 2004; Quadagno 2004) as well as a focus on evidence-based medicine intended to simultaneously control costs and quality of care (Timmermans and Kolker 2004) has coincided with a dramatic increase in health management. Individual clinicians, clinician groups and hospitals have had to deal with efficiency, effectiveness and billing issues in new and more complex ways in order to show profits. Abbott (1988) contends that these

issues will result in diminished effectiveness and therefore declines in overall membership.

As a result, modeling includes a negative effect of size of the health manager population during the study time for both professional groups. Data regarding health managers is included as an exogenous input, based on the actual U.S. Statistical Abstract information. The increase in health managers and administrators is a proxy for the pressure from the changing environment, felt by the professions.

Academic/Abstract Knowledge Sector

The central theme of Abbott's work (1988) is that the power and prestige that can be relatively attributed to professions in the midst of a jurisdictional dispute can in some measure be based on the quality and quantity of its academic and therefore abstract knowledge base. The abstractions supported by the academic knowledge base map out professional, territorial boundaries over which disputes are fought. In this investigation, the expert/abstract knowledge system of each profession is conceptualized from the perspective of the academic literature within a defined jurisdictional boundary. The examination of knowledge has been bounded at two levels. First, the dispute under study is that of neck and/or back pain alone. As such the complete academic/abstract knowledge related to either profession is not of interest here. Second, the academic literature is bounded by the database from which it is gathered. The Medline database was chosen due to its reputation for academic rigor in the healthcare professions as well as the ease with which abstracts (summaries) representing articles by topic, can be found.

Under these boundary restrictions, it is expected that the quality of abstractions between the two disciplines will be relatively more similar than they might be had other

databases been considered. To provide an additional measure of quality, the focus variable resulting from the Crawdad text analysis (based on centering resonance analysis) (Corman et al. 2002) is used. Quantity of abstract/academic knowledge is taken as the number of abstracts per year by discipline.

On the basis of Abbott's (1988) emphasis on academic/abstract knowledge as the foundation for jurisdictional contest and control, it is hypothesized that a smaller contender such as the chiropractic profession can gain market share by definitively increasing the quantity of its abstract knowledge. Theoretically, it is presumed that a larger number of abstracts of roughly the same quality (as determined by inclusion in a data base such as Medline) will result in greater cultural authority within the sphere of professional competition as well as in the view of external agents such as governmental bodies and the public.

Figure 9 provides a representation of the variables and relationships resulting in the generation and accumulation of neck and/or back pain abstracts for the chiropractic profession. The number of abstracts is a function of the rate at which abstracts are generated per professional (Abstracts per DC), and the number of professionals who can be said to be participating in chiropractic research per year (Research Workforce). The research workforce includes those individuals who may not be chiropractors but may be involved in the profession in some research capacity (e.g. PhD researcher, collaborator or even funding agent).

In reviewing the data, it was discovered that there was a temporary increase in the production rate that lasted for the ten year period of time from approximately 1986 through 1996. This timeframe coincides with the successful culmination for chiropractic

of the Wilk anti-trust suit against medicine (McAndrews and McAndrews 1995) as well as the increased awareness of and interest in complementary and alternative therapies by external bodies such as the National Institutes of Health (NIH). To account for this temporary increase in publications, a variable (Mainstream Pub Temp Acceptance) was included.

In addition, the academic/abstract knowledge sector acts as a link in a loop including the components of market share, as well as labor supply. It is expected that a larger base of academic/abstract knowledge will be related to increased interest in chiropractic both as a profession to be involved in as well as a profession from which to seek care.

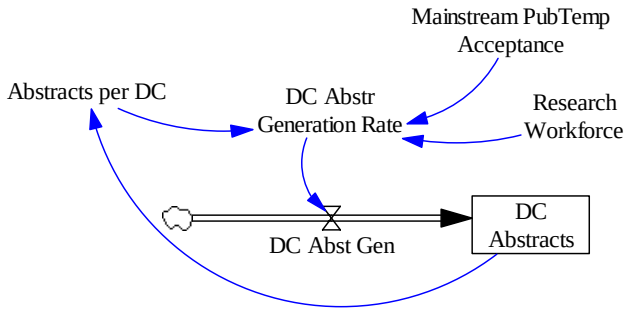


Figure 9. Chiropractic Academic/Abstract Knowledge Variables and Relationships Medical Doctors

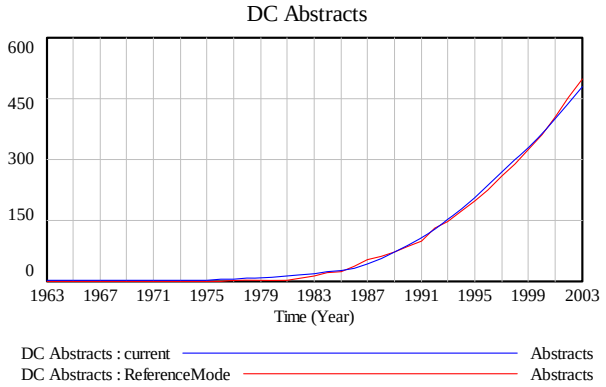


Figure 10: Graph of Actual (Reference Mode) vs. Model (current) Number of Chiropractic Abstracts in Peer-Reviewed Indexed (Medline) Journals per Year

Figure 10 is the resultant modeled data in contrast to the actual number of abstracts in the peer-reviewed and indexed (Medline) literature that is attributed to the chiropractic profession.

Figure 11 represents the relationships modeled for medicine's production of academic/abstract knowledge in neck and/or back pain. Like the model for chiropractic, medicine's accumulation of abstracts is based on the generation rate per doctor and the workforce dedicated to doing the research.

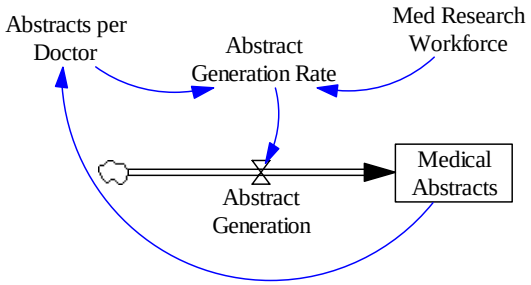


Figure 11: Medicine Abstract/Academic Knowledge Variables and Relationships External Structure Sectors

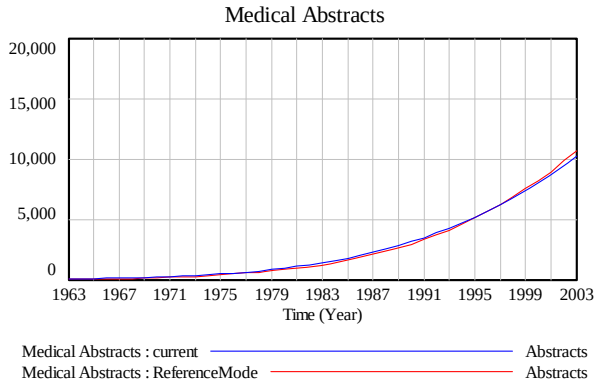


Figure 12: Graph of Actual (Reference Mode) vs. Model (current) Number of Medical Abstracts in Peer-Reviewed Indexed (Medline) Journals per Year

Figure 12 shows the actual number of abstracts from the peer-reviewed and indexed literature, from Medline, per year, in conjunction with the modeled data.

External Environment:

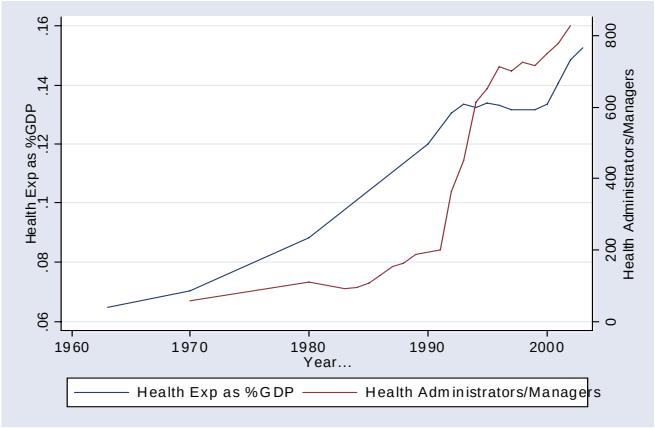
For this study, external circumstances are viewed simply as exogenous stimuli for change, conferring advantage on either of the professions involved in conflict. Two arenas of the external environment are discussed by Abbott and considered here. The first is the public. The public arena includes the cultural values and beliefs that institutionalists would include in the cognitive pillar of an environment (Caronna 2004; Scott et al. 2000). This is where beliefs such as "Western science should be the basis for medicine" (Caronna 2004) are placed. In addressing this arena for the purposes of the model, the external cultural value system has been held fixed to the extent that the

knowledge base drawn for each profession extends only from Medline. The Medline database is assumed, for the context of this investigation, to have a fairly rigorous standard for the journals it contains. By those standards, articles submitted to and accepted in Medline are assumed to meet a reasonable level of scientific merit in the eyes of Western society and therefore the public. While some fluctuation in cultural values has been observed during the time under investigation, for the purposes of this investigation, it has been assumed that the cultural values of science, as the appropriate basis for medicine and healthcare, have not changed significantly over the 41 years studied. Further it has been presumed that where the impact of change in social conceptions such as "alternative medicine" has occurred, the impact to the system has been accounted for internally. In actuality, the cultural value system in any society is extremely complex, and these simplifying assumptions are used for study purposes only.

The second external arena discussed by Abbott (1988) is the legal arena. In an institutional context this would be thought of as the "regulatory pillar" in healthcare (Caronna 2004). Again for the sake of investigation this is accepted as fixed. In particular, it is presumed that because licensing exists for both professions in all states, despite inequalities that may exist, there are relatively stable sanctions that govern both professional bodies. While this is used as a simplifying assumption for the context and emphasis that has been placed on the internal ecology of professional dispute, it should be noted that the complexity of interaction with this arena is largely missing and this may be a limiting factor. For example, changes in Medicare and Medicaid payments have both included and excluded chiropractic or portions of chiropractic work during the study

period. The impact of these as external components of market share has not been considered.

An additional area of interest to Abbott (1988) and of particular concern for the United States healthcare system is an alternate source of regulatory power. This refers to a regulatory power not held by the government in the typical sense of rules and regulations. Rather, in the United States since approximately 1982 (Scott et al. 2000), there has been prominent managerial control of the field as market mechanisms have been used once again in an attempt to solve problems related to the distribution of care. The impact of such an alternate regulatory power has been an increased effort on the part of providers to deal with a fragmented payer system and managed care, by developing extensive billing, auditing and accounting procedures (Woolhandler, Campbell, and Himmelstein 2003). This has translated into a dramatic increase in the health management/administration occupational group in the United States. Figure 13 shows the increase in health expenditures as a proportion of GDP over the study timeframe in conjunction with the increase in health managers/administrators over that same period of time.



Data Source: Statistical Abstract of the United States: 1965 to 2003-2004

Figure 13. Health Expenditures as a Proportion of GDP and Health Managers/Administrators (in the thousands) from 1963 to 2003

The change to managed care in the 1980's initially appeared to have the effect of halting the continued progression of expenses in the 1990's. At the same time, however, the health administration burden increased dramatically in the early 1990's and by 2000, healthcare expenditures had begun to rise again.

For this study, the impact of external factors on the system of professions (medicine and chiropractic) is viewed from the perspective of the added administrative burden. From this it could be suggested that the majority of the impact would be focused on medicine. However, work completed by Winnick (2006) indicates that the level of competition between medical doctors and chiropractors may increase as the level of managed care in a given area rises. In her bureaucratization model, she found a statistically significant increase in doctors identifying themselves as holistic practitioners when HMO penetration was higher.

Market Share

The outcome of interest in this study is the market share achieved by chiropractors, in terms of numbers of people seen, on a yearly basis. Figure 14 provides a representation of the influences that have been attributed in this model to people seeking chiropractic care. Overall, the number of people seen by chiropractors is determined by the difference between those choosing chiropractic and those not choosing the profession. The rate at which people choose to be seen by chiropractors in the United States is viewed to be affected by the size of the population (the number of potential patients), the supply of chiropractors, and the number of people currently seen by the profession. That is, a larger population is expected to be associated with a greater number of people who may seek chiropractic care. In addition, the larger the supply of

chiropractors and the more visible the chiropractic profession, the greater the potential to choose the profession when care is actually needed. Finally, a larger number of people currently seeing chiropractors also enhances visibility and helps via feedback to other potential patients.

As discussed earlier, the number of abstracts within a credible data base associated with the profession is expected to be related to professional authority. Thus a larger number of abstracts are modeled to increase the number of people choosing chiropractic care. The number of abstracts variable was weighted by the abstract "focus" measure.

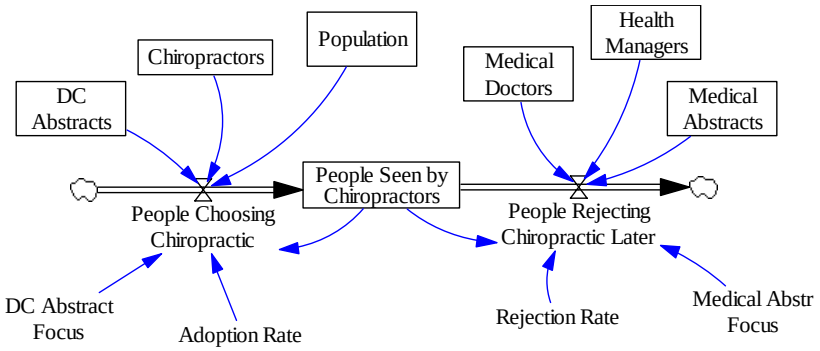


Figure 14. Variables and Relationships Surrounding Market Share (People Seen by Chiropractors

The rate at which people choose not to be seen by chiropractors is modeled to be weighted by the supply of alternatives (number of medical doctors), people already seen by the profession, as well as the extent to which the alternative is motivated to encroach on the jurisdiction currently held by chiropractic. This is proxied by the response of medicine to managed care via the inclusion health managers/administrators. Credibility of the competitor (medicine) is based on the number of abstracts in Medline weighted by the "focus" as an additional measure of quality. Professional association membership (Medicine and/or Chiropractic) was not found to impact market share in any way. For

the sake of simplicity then, this factor has not been included in Figure 14 and subsequent analyses.

Figure 15 is a graph of the available versus modeled data regarding the number of patients seen by chiropractors in the United States.

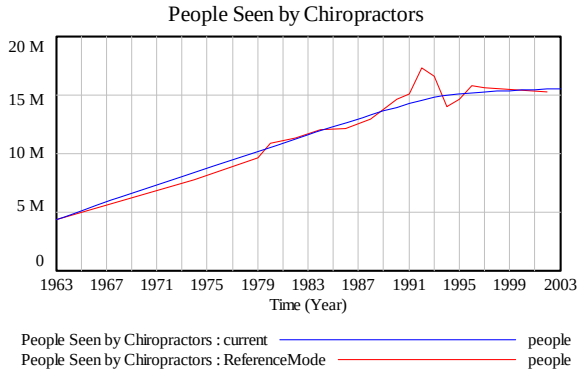


Figure 15. Graph of Actual (Reference Mode) versus Predicted (Current) Data for Market Share (People Seen by Chiropractors)

Two spikes in the actual data on the graph of market share are not accounted for in the model. The first is a large spike (and subsequent drop) that occurred in the early 1990's. This was a period during which substantial media attention was directed at the public's use of alternative and complementary medical procedures. The second is a small, sharp increase in market share that was documented in 1996. This smaller spike occurred soon after the widely publicized Agency for Health Care Policy and Research (AHCPR) report on acute low back pain concluded that only NSAIDS and manipulation (which is largely performed by chiropractors) were effective modes of care at the onset of this condition (Bigos et al. 1994).

Results and Discussion

Guided by theory (Sterman 2000; Abbott 1988), relationships between supply of labor, professional association membership, academic/abstract knowledge production and chiropractic market share were derived. System Dynamics modeling procedures were

used to explore associations, system feedbacks and later, the implications of policy changes.

The model created in this investigation was based on the flow of people from the general population through the internal system of inter-professional conflict. Like any model extending from rich theory, this one is a simplification of a much more complex series of processes. Elements for inclusion were chosen on the basis of representation from each of the spheres of interest in Abbott's internal environment, and the availability of data. The model includes a variety of assumptions, such as the homogeneity of professions studied. Further, the academic/abstract knowledge base of "medicine" included all conservative care providers (e.g. physical therapy) as part of the medical community. Breaking the professions down into more diverse components would provide a more complex, and possibly more revealing, evaluation of professional relationships.

The decision was also made to exclude virtually all components of the external environment within which professional conflict is displayed. The logic for this was Abbott's notion (1988) that internal dynamics must be understood before study of external dynamics can proceed. The exception is the inclusion of the administrative burden to the system. This was chosen for inclusion because of the exceptional changes that occurred in this industry during the time of the study and the expectation that this burden would have placed substantial pressure on the professions described.

To answer the question about what a minor profession might do to gain market share when in competition with a major opponent, two strategies were tested. It was hypothesized first, based on Abbott's concept of interprofessional conflict "currency,"

that a minor profession such as chiropractic should dramatically increase its production of academic abstract knowledge. In doing so, its claim, in this case to neck and/or back complaints, would be expected to be stronger, resulting in a larger proportion of people seeking chiropractic care. However, even when the rate of academic knowledge production for the chiropractic profession was set, so that within 30 years, the ratio of chiropractic to medical abstracts would be the reverse of what it was in 2003, the first sign of positive market share change occurred after a 13 year delay. Although by 30 years there was evidence of greater movement toward the chiropractic profession, one must ask whether such a strategy could realistically be devised and sustained by a minor profession for such an extended period of time. Research requires funding and personnel, both of which have been challenges for the chiropractic profession for a long time (Meeker, Mootz, and Haldeman 2002). The problem for a minor profession, trying to overtake the productivity of a major one, which is motivated to maintain its market share, seems formidable. Not considered in this simulation, however, are the means by which a strategy, such as increased academic/abstract knowledge, might be facilitated by factors other than those currently in the model. For example, it is possible that the effects of research could be amplified by media attention. The impact of the media in altering inter-professional dynamics remains unstudied but may reveal strategies as yet not understood in bolstering the impact of actions by a minor profession.

The second strategy by which a minor profession such as chiropractic was hypothesized to gain market share was through increasing its professional association membership. This was tested by doubling the entrance rate of its members from 2004 forward. By the year 2033 this would result in the inclusion of 78% of chiropractors in

their association. This is comparable to the over seventy percent American Medical Association membership that existed prior to the study period and during the time of medical dominance.

Regardless of the dramatic increase in membership numbers, no change in market share was observed in the model data. There are a host of possible explanations for this. The strength of a professional association is not only marked by the number of participants. While representation is an important factor when lobbying for legislative change, equally important are parameters such as strong leadership (Hodson 2004) and a clear agenda (Light 2004; Starr 1982). In addition, the revenue generated by large inclusion rates provides professional organizations with the ability to form strong lobbies and actualize agendas. None of these factors were included in the model at hand. Again, greater elaboration of the various constructs that make a variable valuable could change the outcome.

In addition to strategies that a profession has access to and therefore might employ to gain market share, there are other factors within a system of professions that may advantage one profession over another. To evaluate this, the third hypothesis was constructed around the supply of dominant professionals. Popular press (Cauchon 2005) predicts that there will be a medical doctor shortage for the baby boomer generation and that therefore, there is a need to increase the number of medical doctors graduating per year over the next few decades. Subsequently it was, hypothesized that an even greater increase in the supply of this dominant profession would result in the annexing of chiropractic's jurisdiction, in an effort to meet medicine's growing economic needs. Evidence of this was found. When the modeled number of medical doctors graduating

was doubled from 2004 forward, there was a substantial decrease in the number of people seen by chiropractors over the 30 year run of the modeled policy change. A doubling of the number of medical doctors represents an extreme boundary for such a policy change. Negative effects were observed almost immediately and were clearly apparent within eight years of initiating the change.

When a 1.5 times increase in graduating medical doctors was modeled, this was observed to create the 10,000 more doctors per year that Cauchon's article in *USA Today* (Cauchon 2005) stated would be needed for the aging population. This too resulted in a severe drop in market share for chiropractic. While doubling the rate yielded a 26 percent decrease in market share after 30 years, a 1.5 times increase in the graduation rate of doctors yielded a substantial 14 percent decrease for that same time period. In either case, the impact was dramatic.

Finally, although Abbott recommended prioritizing the internal dynamics of professional conflict, it is understood that such conflict occurs within an environment that ultimately may affect an adversarial outcome in one direction or another. As such, policy change involving health administration personnel was also tested. The surge in health administration personnel has been perceived as a bureaucratic burden to the healthcare system at large (Woolhandler, Campbell, and Himmelstein 2003). In the model, an increased administrative burden was perceived as a threat to the incumbent medical profession. Medicine's response was expected to be the poaching of additional territory from minor players in order to maintain authority and income. It was hypothesized then, that continuing to increase the administrative burden in healthcare, arbitrarily at 10,000

more administrators per year, would result in a decrease in chiropractic market share over thirty years. The results were consistent with expectations.

Figure 16 is a summary of the model results discussed. The model is run through 2003, at which time policy changes were implemented. This decision was made in order to take into account the path dependency (Kurdas 1994), that has taken both professions to their 2003 conditions of specific labor and knowledge base characteristics. The baseline (No Policy Change) values and the "Double ACA Join Rate" values overlap, therefore, baseline values can be considered the yellow line in Figure 6.1 below. The impacts for all other policy changes in comparison to the baseline run are evident.

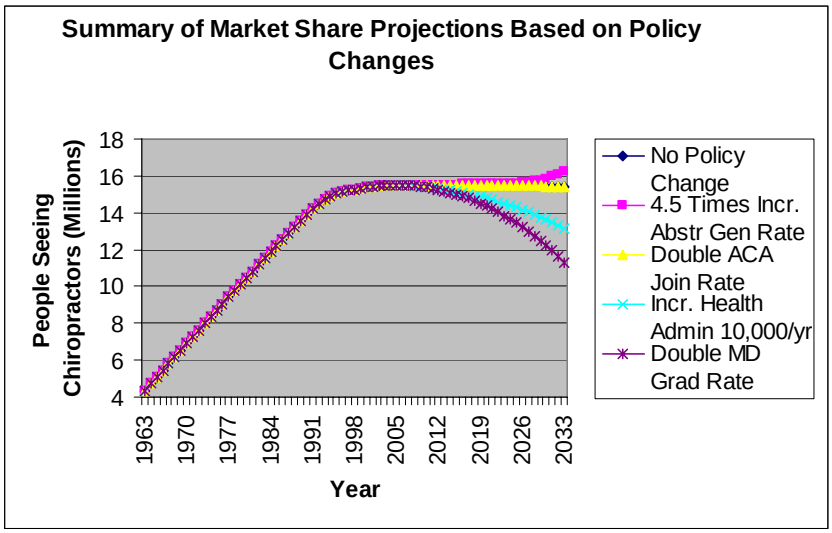


Figure 16. Model Results for Four Proposed Policy Changes affecting Chiropractic Market Share

Figure 16 suggests that the negative effects of an increase in the supply of the dominant profession or an increase in administrative burden will be seen sooner than the positive effects of an increase in academic/abstract knowledge. Negative effects are apparent on the graph approximately five years after the changes are implemented. For the academic/abstract knowledge change, the delay is over 20 years. Although Abbott (1988) predicted that changes in the public arena would occur over a 10 to 20 year period, impacts from changes in supply and reactionary pressures by the dominant

profession were observed to occur sooner. Information about such differences in timed effects could prove useful to those planning strategies to offset market share losses.

Finally, the results of this investigation suggest that Abel (2003) may have been incorrect in his assertion that: "The genie of competition cannot be forced back into the bottle of restrictive practices after it has escaped." (p. 480) Using a case study approach and incorporating theoretical relationships posited by Abbott (1988) into a System Dynamics model, suggests that an incumbent profession has much power and a good deal of time during which to retain or capture greater market share from its opponents. In general the model favored the retention of medicine's monopoly power.

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