A REPORT ON THE ROLE OF ECONOMIC MOTIVATION IN THE PERFORMANCE OF MEDICAL SCHOOL FACULTY

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The author dedicates this Paper to his wife and symbolically to the wives of all academicians, for their forebearance in tolerating husbands whom this study demonstrates statistically are neglectful of them (p = <0.01).
A REPORT ON THE ROLE OF ECONOMIC MOTIVATION IN
THE PERFORMANCE OF MEDICAL SCHOOL FACULTY

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I. INTRODUCTION

John W. Gardner recently analyzed the counterpoised
forces that are responsible for the success of our society [1].
On one hand, there is the "let-the-best-man-win" philosophy
that grants special privileges to the individual who ex-
hibits intelligence, creativity, and motivation. On the
other hand, there is the concept that "all-men-are-created-
equal" that assures the individual certain inalienable rights
regardless of his capacities. These forces establish the
critical lines of tension in modern society. Each makes a
valuable contribution. Mr. Gardner concludes: "This ten-
sion will never be resolved and never should be resolved.
Failure to accept this reality has led to a lot of nervous
indigestion and unnecessary commotion." There is an analogous
relationship between intellectual motivation and economic
motivation as forces that shape the destiny of clinical de-
partments within medical schools.

At the turn of the century, Abraham Flexner demonstrated
that economic motivation in our culture had caused an educa-
tional disaster in medical schools within the United States

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Presidential Address, 31st Annual Meeting of The So-
ciety of University Surgeons, Pittsburgh, Pennsylvania,
February 13, 1970. In response to a number of requests,
this prepublication manuscript is made available through
the courtesy of The RAND Corporation.
and Canada. Flexner's perceptivity and vision introduced the scientific method into clinical teaching, established the concept of the university hospital, and promoted the idea of a cadre of clinical teachers whose first obligation was to medical education. Since Flexner's time, the subject of economic motivation has been a pariah unacceptable for discussion in polite circles of the academic community. For example, current discussions by Kornberg [2] and Durant [3] of motivations in medicine ignore the subject. The John and Mary R. Markle Foundation recently sponsored a conference on "Motivation in Medicine" [4]. During the three-day symposium involving experts in motivation and leaders in academic medicine, not a single mention was made about economic motivation. It is appropriate, therefore, to examine economic motivation as a force, for better or worse, to determine how medical schools serve the needs of contemporary society. The examination should rely, not on emotion and opinion, but upon objective data obtained and evaluated under the vigorous constraints of the scientific method.

Flexner never considered, as an absolute, the plan to remove economic motivation by the strict full-time salary plan. Rather, he looked upon the plan as an experiment that he had initiated. Flexner viewed himself as an investigator who identified the problem, designed the experimental protocol, and obtained a research grant from the Rockefeller General Education Board. Now, a half century later, it remains for us to observe the results, to analyze them statistically, and to draw conclusions.

II. METHOD OF STUDY

The objective of the study was to evaluate the effect of intellectual motivation and economic motivation upon patient care and teaching, and upon the extent to which
individual faculty members and institutions were meeting the needs of society in the medical education field. Background information and definitive data were obtained from 19 university medical schools. Information from 11 of these institutions was gathered over a period of years, either during the author's employment in the schools, or by interviews with department chairmen, deans, and university presidents. The information gained was used to design the protocol for a personally conducted survey involving 94 faculty members, from clinical departments at 9 medical schools, during a 2-month period in 1969. The nine institutions were selected using several criteria, including recent greatness, current prominence, or promise for the immediate future. The institutional salary plans are outlined in Table 1.

In order to best evaluate the role of motivational influences in the performance of clinical faculty members, the survey questionnaire included two questions: 1) how does the faculty member spend his work week (i.e., teaching, research, administration, patient care, travel, etc.)? and 2) is he paid a guaranteed salary (strict full time, SFT), or is his income dependent to some degree on money earned in clinical activity (geographic full time, GFT)?"
Table 1
REMUNERATION PLANS AT INSTITUTIONS SURVEYED

<table>
<thead>
<tr>
<th>School</th>
<th>No. of Interviews</th>
<th>Method</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-J</td>
<td>Background information and anecdotal data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>8</td>
<td>SFT</td>
<td>Long standing</td>
</tr>
<tr>
<td>L</td>
<td>9</td>
<td>SFT</td>
<td>Long standing</td>
</tr>
<tr>
<td>M</td>
<td>8</td>
<td>SFT</td>
<td>Changed abruptly from GFT to SFT 5 years ago</td>
</tr>
<tr>
<td>N</td>
<td>8</td>
<td>SFT/GFT</td>
<td>In transition from GFT to SFT. New appointees in past 3 years are required to be SFT</td>
</tr>
<tr>
<td>O</td>
<td>29</td>
<td>GFT/SFT</td>
<td>Optional with individual (SFT salaries 150% to 180% of GFT salaries)</td>
</tr>
<tr>
<td>P</td>
<td>10</td>
<td>GFT/SFT</td>
<td>Department practice at discretion of Chairman of Executive Committee. Income related to &quot;productivity,&quot; clinical, and otherwise. Premium paid to faculty accepting clinical responsibility.</td>
</tr>
<tr>
<td>Q</td>
<td>9</td>
<td>GFT/SFT</td>
<td>Department option</td>
</tr>
<tr>
<td>R</td>
<td>3</td>
<td>GFT</td>
<td>In transition from voluntary faculty for 5 years</td>
</tr>
<tr>
<td>S</td>
<td>9</td>
<td>GFT</td>
<td>In transition from voluntary faculty for 3 years</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>94</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
each task performed by a faculty member from the time he entered the hospital until he departed. The hours spent working, writing, or studying at home were not considered work hours. Subjects invariably employed a detailed office diary, accounting for the excellent correlation between total hours spent at the hospital, and the sum of the total hours spent at the recorded tasks. Opinions volunteered by the subjects were enlightening because they revealed the tensions and concerns existing in various medical schools; however, subjective observations were not included in the data base.

Information on the following 18 variables was recorded during a 30-min interview:

1) Age and specialty.
2) Academic rank.
3) Research grants: Total direct costs of extramural research support from all grant sources when the faculty member was named as a principal investigator.
4) Teaching time: Subcategorized into the time spent teaching house staff, students, residents and students together, and lecture time. The time spent by a pediatrician in the supervision of a resident service where the faculty member did not have a personal, total responsibility for the care of the patient was categorized as teaching time. The time spent by surgeons in the operating room supervising residents was categorized as teaching time, unless the surgeon had personal and total responsibility for patient care.
5) Research time: Subcategorized into time spent in the laboratory, in conference, in planning, in writing manuscripts, and in grants administration.
6) **Administrative time:** Subcategorized into time spent on matters relating to hospital, department, or subdepartment, school, university, and national activities (societies, consultation for the National Institutes of Health, etc.).

7) **Patient-care time:** Subcategorized into care given in the hospital ward, in private office, in the operating room (surgeons), and "other." Despite the confusion introduced by the question of "identifiable personal service" as defined by third-party agencies, an experienced observer has no difficulty in determining the patient's doctor. (Who does the patient say he is? Whom does he telephone when he is ill at night?)

8) **Work week:** Hours spent at the hospital each week are computed independently from the foregoing time distribution on the basis of the time elapsing between arrival and departure time. The travel time is excluded.

9) **Travel time:** Time spent on professional travel in connection with medical meetings, consultation for the Federal Government, university business, etc.

10) **Saturday time:** Hours spent in the hospital the Saturday preceding interview.

11) **Sunday time:** Hours spent in the hospital the Sunday preceding interview.

12) **Satisfaction with financial remuneration:** Each individual was asked if he was "satisfied" with the financial compensation given for his work. No discussion was held on the point, but the response was graded as "yes," "no," or "equivocal."

13) **Visibility Index (VI):** This Index is based on data contained in the subject's curriculum vitae and bibliography, and is an arbitrary measure of scholarly, clinical, and political eminence. The
scale is a Paper Unit (P.U.), one of which is assigned for each scientific publication appearing per year when averaged over the most recent two calendar-year period. Varying numbers of additional P.U.'s were assigned according to a scale of values.†

14) System of financial remuneration: "Strict full-time" (SFT) refers to the receipt of a fixed salary determined by academic rank, institutional policy, or by salaries in the competitive marketplace: "Geographic full time" (GFT) refers to remuneration schemes in which a base salary is paid by the university (usually much less than SFT salaries), and the individual is expected to earn some increment above this base salary (usually limited by a ceiling). If salary is fixed, but adjusted annually on the basis of earnings, the GFT classification was used. The essential element of the GFT classification is the personal economic incentive.

†Coeditor of book (4 P.U.); principal officer of regional or special interest society (4); membership in the most selective one or two national societies in the subject's specialty (4); special consultant to military, national only (5); president of regional or special interest society (6); Markle or Guggenheim scholar (6); special consultant to the National Institutes of Health (6); editor of major journal, or principal editor, or author of a major textbook (7); principal officer of a major national society, or president of special interest society (7); president of a major national society (10); member of specialty board (10); member of NIH study section (10); Lasker or Nobel Prize (15). The assignment of 15 Paper Units to a Nobel Prize was intended as a gentle reminder that the Visibility Index should not be taken too seriously. Several individuals seriously suggested, however, that points be subtracted for very great honors and accomplishments. Their rationale was that distinctions such as the first organ transplant, or the first solo circumnavigation of the globe generate a disruptive spirit in an individual, because these distinctions attribute instant omniscience in such diverse fields as world politics, theology, and medical education.
The preliminary survey of 10 universities suggested that considerable difficulty would be encountered in obtaining an objective measure of participation, by individual faculty members, in the area of personal patient care. It was found, for example, that several national surveys of faculty time distribution included, as "patient care time," hours spent on ward rounds teaching the house staff. The interviewer's data sheet was, therefore, designed to record the hours that the faculty member used during the normal patient-physician relationship. The faculty member was asked to cite the number of instances in the preceding seven days during which he personally did any one of the following, and to record the results in writing: 1) examination of a patient's nasopharynx, 2) measurement of blood pressure by sphygmomanometer, 3) auscultation of the heart and lungs, or 4) a rectal examination. Answers were so frequently negative that it was embarrassing to both subject and interviewer. Therefore, items 15 through 18 were developed to determine more obliquely if the faculty member was actually spending time caring for the sick:

15) Patients in hospital: The number of hospitalized patients under the subject's personal care on the day of interview was assumed to be an index of the subject's clinical activity, and was more objective than an estimate of the number of outpatient visits.

16) Examinations/operations: This area covered the number of complete examinations or consultations performed by non-surgeons during the week in hospitals or in private offices. Brief or return visits were excluded. Surgeons gave the number of operations when they were present, and when they had personal, total responsibility for the patient's care.

17) Emergencies: The subject was asked to state the number of times during the previous three months
when he had found it necessary to return to the hospital from home or for medical emergencies.

18) Autopsy permissions; personally obtained: It was considered probable that the physician who is personally responsible for the care of a patient and has a normal patient-doctor relationship would be the person to console the family and to ask for permission for an autopsy in event of the patient's death. If he were only administratively responsible for patients in a hospital ward, it seemed probable that he would avoid this most unpleasant of all medical experiences, and defer to the patient's personal physician. Statistical analysis confirmed these suppositions later by indicating that this variable was one of the best ways to separate GFT faculty from SFT faculty members. Each individual was asked to state how many months it had been since he personally had obtained an autopsy permission. If he stated "more than a year," "don't remember," or "never," 99 months was arbitrarily recorded. Results are presented in terms of the percent of physicians who had obtained a permission within the previous 12 months.

III. OBJECTIVE RESULTS

Approximately 14,000 original and derived data points were collated, computerized, and analyzed by the Biomed Programs [5] to determine means, standard deviations, probability coefficients, correlation coefficients, discriminate analysis, and stepwise discriminate analysis. Available techniques permit the simulations evaluation of the entire data package to determine the significance of various
factors used to determine the behavior of individual faculty members.

Figure 1 is a computer-generated graphic output demonstrating a clear separation of faculty members into two distinct groups based upon whether they are paid a straight salary, or are required to earn a portion of their salary through clinical practice. This data is especially remarkable when one considers that the input data involved the physician's activities during a single week when personal illness, holidays, and professional travel might tend to make such a short survey period produce erratic results.

Figure 2 demonstrates that there are distinct differences in the behavior patterns of surgeons and non-surgeons, quite independent of differences related to economic motivation. Although the objective of the investigation was to compare GFT and SFT faculty members, the appearance of behavioral differences between medical specialties requires that medical specialty, as well as method of remuneration, be considered in the presentation of data.

Figure 3 compares SFT and GFT non-surgeons. The wide separation of groups within discriminate analysis areas shows a high degree of economic motivation affecting the behavior of non-surgeons.

Figure 4 compares a group of SFT and GFT surgeons. There is a considerable overlap between the groups, suggesting that economic motivation plays a much lesser role in the behavior of academic surgeons than among academic non-surgeons.

Most observers will not be surprised at the different behavioral characteristics of SFT and GFT faculty members. For nearly half-a-century, GFT faculty members have been considered to be economically motivated, to do little research, to have minimal extramural grant support, to be distracted from their teaching obligations by clinical practice, to spend little time with their students, to
Fig. 1--Stepwise Discriminate Analysis of 17 Behavioral Factors Comparing GFT and SFT Faculty Members (14,000 datum points)

Each point represents one faculty member, the location of each point is determined by the individual's behavior in relation to the 17 variables measured. Approximately 150 original and derived datum points are used in determining the behavioral characteristics of each individual. So great is the influence of economic motivation that the faculty can be separated into SFT and GFT groups on the basis of their behavior (computer-generated graphic display, retouched). The relative importance of each behavioral factor is indicated by F values, and by probability coefficients in Table 2. Triangles indicate means for the groups.
Fig. 2--Stepwise Discriminate Analysis of 17 Behavioral Factors Comparing Surgical and Non-Surgical Faculty (14,000 datum points)

The behavioral characteristics of surgeons and non-surgeons are so different that they are readily separated into two populations.
Fig. 3--Stepwise Discriminate Analysis of 17 Behavioral Factors Comparing SFT versus GFT Non-Surgeons (approximately 7000 datum points)

The distinct separation of the two groups is evidence of a very strong economic motivation in the behavior of non-surgeons.
Fig. 4--Stepwise Discriminate Analysis of 17 Behavioral Factors Comparing SFT and GFT Surgeons (approximately 7000 datum points)

The considerable overlap in the two groups shows the lesser role of economic motivation in the behavior of surgeons. Nevertheless, there is a highly significant statistical difference between the groups.
neglect administrative matters, and to lack scholarly distinction. In contrast, SFT faculty members are viewed as having intellectual rather than economic motivation, engaging actively in research, having abundant grant support, spending much time teaching, being available to the students, carrying a heavy administrative burden, and achieving national and international recognition for their scholarly activities. Surgeons are considered to possess an exaggerated form of the undesirable characteristics of GFT faculty members. Interestingly, all but one of these shibboleths are false! If SFT and GFT faculty members behave differently, it is important to determine if these behavioral characteristics are desirable or undesirable in relation to their effect on the school's ability to achieve its mission.

Table 2 lists the variables, in decreasing importance, showing how the variables differentiate between GFT surgeons and GFT non-surgeons, and between SFT surgeons and SFT non-surgeons.

The graphic presentations in Figs. 5-8 present the behavior of each of the four groups of faculty members. They are arranged in decreasing importance using variables to show differences in the groups.

CLINICAL ACTIVITY (SEE FIGS. 5 AND 6)

SFT, GFT surgeons, and GFT non-surgeons spent the same amount of time per week giving personal medical care (14.5 hr, 18.9 hr, and 14.6 hr, respectively, p = n.s.). In contrast, the average SFT non-surgeon spent only 3.4 hr a week (p = <0.001). Actually, the median-time is much less because 45 percent of all hours of personal medical care was provided by two individuals. Each individual worked in a department that employed from 40 to 80 individuals, all of whom were reluctant to see patients. Each individual volunteered that he had little interest in research, was hired specifically to see patients, and for purposes of promotion, was considered
Table 2

BEHAVIORAL CHARACTERISTICS USED IN DIFFERENTIATING SFT SURGEONS, SFT NON-SURGEONS, GFT SURGEONS, AND GFT NON-SURGEONS. F VALUE DETERMINED BY DISCRIMINATE ANALYSIS

<table>
<thead>
<tr>
<th>Variable</th>
<th>F</th>
<th>p†</th>
<th>Discrimination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient care</td>
<td>16.622</td>
<td>&lt;0.001</td>
<td>4 groups</td>
</tr>
<tr>
<td>Autopsy</td>
<td>15.452</td>
<td>&lt;0.001</td>
<td>4 groups</td>
</tr>
<tr>
<td>Exams/Operations</td>
<td>8.215</td>
<td>&lt;0.001</td>
<td>4 groups</td>
</tr>
<tr>
<td>Patients</td>
<td>6.645</td>
<td>&lt;0.001</td>
<td>4 groups</td>
</tr>
<tr>
<td>Emergencies</td>
<td>6.195</td>
<td>&lt;0.001</td>
<td>4 groups</td>
</tr>
<tr>
<td>Sunday time</td>
<td>5.299</td>
<td>&lt;0.005</td>
<td>4 groups</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>5.297</td>
<td>&lt;0.005</td>
<td>4 groups</td>
</tr>
<tr>
<td>Research</td>
<td>4.593</td>
<td>&lt;0.005</td>
<td>4 groups</td>
</tr>
<tr>
<td>Saturday time</td>
<td>4.191</td>
<td>&lt;0.01</td>
<td>4 groups</td>
</tr>
<tr>
<td>Work week</td>
<td>3.108</td>
<td>&lt;0.01</td>
<td>4 groups</td>
</tr>
<tr>
<td>Grants</td>
<td>2.842</td>
<td>&lt;0.05</td>
<td>4 groups</td>
</tr>
<tr>
<td>Age</td>
<td>2.378</td>
<td>&lt;0.001</td>
<td>GFT vs SFT</td>
</tr>
<tr>
<td>Visibility Index</td>
<td>1.297</td>
<td>&lt;0.05</td>
<td>S vs NS, stepwise</td>
</tr>
<tr>
<td>Travel</td>
<td>1.105</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Administrative</td>
<td>0.651</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Teaching</td>
<td>0.649</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>Rank</td>
<td>0.648</td>
<td>n.s.</td>
<td></td>
</tr>
</tbody>
</table>

†p = probability coefficient. Although a single variable with a "not significant" (n.s.) probability coefficient may not differentiate the groups, a combination of not-significant variables may do so. It is important to note that this table is used to discriminate among 4 groups. Combining subjects into 2 groups, instead of 4, may produce significant values for p (e.g., age and Visibility Index).
Fig. 5--Comparison of the Behavioral Characteristics of Four Groups of Faculty Showing Clinical Activity

GFT-S: geographic full-time surgeons; GFT-M: geographic full-time non-surgeons; SFT-S: strict full-time surgeons; SFT-M: strict full-time non-surgeons. Autopsy permission refers to the percent of the group who personally obtained autopsy permission on a patient during the preceding 12 mo. F values are determined by discriminate analysis for differences among four groups. Differences in this slide are significant to the level, p = less than 0.001. Surgeons behave in a manner that is characteristic of their specialty, irrespective of the remuneration method. In contrast, there is evidence of a high level of economic motivation in the behavior of non-surgeons.
Surgeons, whether GFT or SFT, behave in a manner similar to GFT non-surgeons. In contrast, strict full-time non-surgeons illustrate a profound effect from lack of economic motivation. The latter group rarely leaves home at night, and does not work on Sunday. A high degree of dissatisfaction with financial remuneration is expressed by strict full-time non-surgeons, although data from this study, combined with that of Goldberg [7], shows they receive the highest hourly rate of remuneration. Strict full-time faculty members spend approximately twice as much time in research-related activities as do geographic full-time faculty members, in keeping with the popular conception of the behavior of the two groups.
Surgeons work longer hours on Saturday than non-surgeons. No evidence of economic motivation is apparent by observing the length of the surgeon's work-week, because both groups work 60 hr per week regardless of the remuneration method. GFT non-surgeons work a 50-hr week, and SFT non-surgeons work 45 hr per week. The difference between the extremes equals two normal working days per week. Extramural grant support is significantly higher among GFT non-surgeons. Data obtained from the Statistics Branch, National Institutes of Health, indicate that federal grant support of GFT surgeons is 29 percent greater than SFT surgeons at institutions in the survey. The mean age of SFT faculty members is 4.6 years younger than GFT faculty. This data is interpreted as supporting the empirical observation that SFT institutions are having difficulty recruiting and holding distinguished faculty members.
Fig. 8--Comparison of Behavioral Characteristics of Four Faculty Groups, Visibility Index, and Distribution of Time

Differences between groups for variables illustrated in this slide are not significant at the p = 0.05 level (exception is the higher visibility index for GFT surgeons on a stepwise discriminate analysis). Contrary to the popular image, SFT faculty members do not spend more time doing teaching and administrative duties.
an "exception." Of the remaining 30 SFT non-surgeons in the survey, 13 spent no time whatever during the week preceding the survey in the practice of medicine.

Evidence of the economic motivation role as it influences the behavior of non-surgeons is seen in data concerning physical examinations, operations, and emergencies requiring the physician to leave home. SFT surgeons do an average of 2.2 operations per week, as contrasted to 3.5 operations for GFT surgeons. The fewer operations performed by SFT surgeons are not by choice, but are a source of major dissatisfaction. It was an almost universal complaint among SFT surgeons that they had inadequate clinical material to maintain their professional competence. They stated that this lack of clinical material was due to the fact that GFT non-surgeons preferentially referred all surgical cases to GFT surgeons. Moreover, the unwillingness of their associate SFT non-surgeons to see patients created a shortage of clinical material in the teaching hospital. This complaint is supported by data showing that GFT non-surgeons performed 6.6 full examinations per week, whereas SFT non-surgeons performed only 1.5 examinations (p = <0.001). Similarly, although SFT and GFT surgeons along with GFT non-surgeons responded regularly to emergency calls at night (8.8 calls, 6.6 calls, and 4.8 calls per 3-month period, respectively), SFT non-surgeons rarely responded (1.1 per 3 months, p = <0.001).

Another objective measure of the physicians' involvement in clinical medicine is the number of hospitalized patients under the physician's personal care on the interview day. GFT surgeons averaged 7.0 patients, SFT surgeons 5.0 patients, GFT non-surgeons 3.3 patients, and SFT non-surgeons 1.2 patients (p = <0.001).

One of the most serious problems relating to presented data is the question of maintaining the professional competence of medical school clinical faculty members. Is it possible for a professional person to maintain his clinical
competence under these circumstances? A partial answer to this question was obtained in the early phases of the study by asking the subjects to identify their family pediatrician as SFT or GFT. It was clear that a large fraction of the SFT faculty members do not choose their SFT colleagues to provide their personal medical care. The data were not included in the statistical evaluation because the reason for the question proved transparent, which necessitated discontinuing the data.

TEACHING, ADMINISTRATIVE, RESEARCH TIME, AND TRAVEL TIME
(SEE FIGS. 6 AND 8)

Contrary to popular belief, the GFT faculty members spend more time teaching than SFT faculty members, and surgeons spend more time teaching than non-surgeons. The differences in teaching time are not statistically significant (GFT-S, 13.0 hr; GFT-M, 12.4 hr; SFT-S, 11.7 hr; SFT-M, 10.7 hr, p = n.s.). A similar difference is observed in administrative time where GFT surgeons and GFT non-surgeons spend more time than their SFT counterparts (GFT-S, 14.3 hr; GFT-M, 12.8 hr; SFT-S, 12.5 hr; SFT-M, 11.0 hr, p = n.s.).

In the entire study, the only support for the common viewpoint about the difference between GFT and SFT faculty members was in the data on time spent doing research. SFT surgeons spent 15.6 hr, and SFT non-surgeons spent 15.9 hr per week in various activities that were related to research. The comparable figures for the GFT faculty were 7.7 hr for surgeons, and 7.5 hr for non-surgeons (p = <0.01).

The 13.4 hr spent per week by SFT non-surgeons traveling may be related to economic motivations (SFT surgeons, 3.3 hr, GFT surgeons, 8.2 hr; GFT non-surgeons, 7.8 hr, p = n.s.). During the course of interviews, it was stated candidly, by the surgeons, that the purpose of this travel was often for the honorarium involved. The recent data of Goldberg [6]
indicates that 17 percent of the 1370 full-time medical faculty members consult for commercial pharmaceutical houses. If one considers it unlikely that surgical specialists are so involved, it is apparent that a large fraction of nonsurgical faculty members are being motivated by economic influences to spend time away from the medical school.

**INTENSITY OF PERSONAL EFFORT (SEE FIGS. 6 AND 7)**

There are striking differences in the hours spent at the hospital (work-week) according to economic motivation, and to medical specialty. There is no evidence of economic motivation among the SFT and GFT surgeons, with a work-week of 60.0 and 60.1 hr, respectively. GFT non-surgeons work a shorter week of 50.6 hr, and SFT non-surgeons work the shortest work-week of 45.5 hr (p = <0.05). The difference between the extremes equals two normal work days each week. Again, the data suggest a high economic motivation level that influences the behavior of non-surgeons.

There is a highly significant difference in the weekend behavior of faculty members, depending on their specialty and method of remuneration. Both SFT and GFT surgeons work significantly longer hours on Saturday (6.4 and 5.1 hr) than non-surgeons. This time difference is also apparent between SFT and GFT non-surgeons (3.7 and 3.3 hr, respectively, p = <0.005). On Sunday, there is a striking change that sets SFT non-surgeons apart from the other three groups. SFT surgeons, GFT surgeons, and GFT non-surgeons spent significant time each Sunday visiting their patients (2.4 hr, 2.1 hr, and 2.6 hr, respectively, p = n.s.). In contrast, the straight salaried non-surgeons work an average of 12 min (p = <0.005). Actually, 25 of the 28 SFT non-surgeons who were in the city did not come to see their hospitalized patients on Sunday. Three possible explanations for this observation come to mind: 1) patients of SFT non-surgeons are not ill on Sunday, 2) SFT non-surgeons have few patients
in the hospital, and 3) SFT non-surgeons do not have the same personal interest in the care of their patients as GFT non-surgeons and surgeons. The first possibility is unreasonable, and the second two are probable. Again, strong economic motivation shows itself in the behavior of non-surgeons. Because non-surgeons do not receive specific remuneration for their clinical activities, they neglect them.

AUTOPSY PERMISSION (SEE FIG. 5)

Only 19 percent of SFT non-surgeons and 40 percent of SFT surgeons, personally, obtained an autopsy permission in the 12 months preceding the interview. In contrast, 82 percent of GFT non-surgeons and 85 percent of GFT surgeons had obtained autopsy permission.

Requesting a permission for an autopsy is one of the most agonizing tasks in a physician's clinical experience. However unpleasant the circumstances, the compassionate physician who has had a warm relationship with his patient, and with the patient's family, does his best to console the family in their time of grief. The physician's presence under these circumstances is a measure of the quality of his personal relationship with the patient and with the patient's family. The question regarding autopsy permission was a highly fortuitous substitute for the earlier question relating to the performance of specific acts in the physical examination. Since those who were interviewed did not understand its purpose, the question avoided embarrassment to those surgeons who were providing no personal medical care. From the statistical viewpoint, the autopsy variable was one of the most valuable variables in the entire study to differentiate between SFT and GFT faculty ($p = <3 \times 10^{-5}$). In most variables in the study, the SFT surgeons behave more like their surgical colleagues than
like those who are remunerated in the same manner. In the autopsy variable, however, there is definite evidence of a deteriorating patient-doctor relationship among SPT surgeons associated with the absence of economic motivation.

GRANTS (SEE FIG. 7)

Extramural grant support is another variable that shows results contrary to the conventional image of SFT and GFT faculty members. GFT surgeons average $54,060 as compared to $43,657 for SFT surgeons. GFT non-surgeons average $144,333 as compared to $68,274 for SFT non-surgeons (p < 0.05). The results, based on interviews in this survey, were further checked against computer collated data obtained through the Statistics and Analysis Branch, National Institutes of Health. The average annual grant support for research projects and program projects in the departments of surgery included in this study was 29 percent greater in the GFT departments than in the SFT departments. Since grant awards are made through the study section system by peer judgments made on the basis of excellence, this is further evidence that the popular image of GFT and SFT faculty members is incorrect.

AGE AND VISIBILITY INDEX (SEE FIG. 8)

The SFT faculty was significantly younger than the GFT faculty (43.9 vs. 48.5 years, p < 0.001). There is a positive correlation coefficient for the age and visibility index (r = 0.408, p < 0.005). This correlation coefficient gives evidence supporting the empirical observation that SFT institutions are having difficulty recruiting and holding distinguished faculty members.

The visibility index for GFT surgeons was 43.1 years, for SFT non-surgeons 27.0 years, for GFT non-surgeons 25.1 years, and for SFT surgeons 22.8 years (p = n.s.). By using the special technique of stepwise discriminate analysis,
surgeons were found to have a higher visibility index than non-surgeons \( p < 0.05 \).

**SATISFACTION WITH REMUNERATION (SEE FIG. 6)**

A high degree of dissatisfaction with financial compensation was expressed by SFT faculty members. Only 24 percent of the SFT non-surgeons were "satisfied," and 38 percent of the SFT surgeons were "satisfied." In contrast, 72 percent of the GFT non-surgeons, and 88 percent of the GFT surgeons were "satisfied" \( p < 0.005 \). No information on the absolute levels of salary could be obtained by using this survey because it was based on personal interviews. Data from this study, however, can be combined with data from a recent survey by Goldberg [7] on the income of 1370 full-time faculty members. It is interesting that those faculty members showing the greatest dissatisfaction are actually receiving the highest hourly remuneration.

**IV. ANECDOTAL DATA**

During the survey, large amounts of data were recorded in addition to that data forming the computerized data base. Since much of the data was tainted by personal experience, by opinion, and by bias, it is excluded because of the constraint of objectivity imposed on the study. Some data were objective, and others were sufficiently interesting to recount.

**COMMUNITY AND PROFESSIONAL RELATIONS**

A striking contrast was noted in the relations the SFT and GFT institutions had with both the public and the professional community. At SFT institutions, patients experienced delays and difficulties obtaining consultation
from faculty members who had no incentive to see them. At two different universities, it was sometimes necessary to send hospitalized patients by taxi to outside medical offices for consultation. In contrast, an interesting event occurred during an interview with a professor of cardiology who was operating a division on a GFT basis. A physician called from a community hospital 70-mi distant saying that he had a patient in shock with a myocardial infarct, who was too ill to be transferred to the university medical center. A member of the faculty was dispatched to assist the community physician until the patient could be moved. It is not surprising that this university has fewer problems with clinical material and finances than any other university in the survey. Practice income at this school supports many SFT faculty members, and has contributed in a major way to the school's building program. It is interesting that a premium is paid to those faculty members who accept clinical responsibility, and it is interesting that there is an incentive relationship between productivity and income.

An effort was made to get some objective measure of the degree of alienation between the SFT faculty and their professional colleagues. Two large metropolitan areas were selected in which an SFT and GFT institution co-existed. Then, a list was obtained from the county medical society in each city of all members in good standing and ad hoc committees participating in the society for three years. University catalogues were used to determine the number of men from the SFT and GFT schools who were active in the affairs of the county medical society. In a sample of 702 physicians, the preponderance of GFT over SFT faculty membership was in a ratio of 6 to 1. Poor relations with the professional and patient community seemed to correlate with the shortage of money and clinical material that existed at the SFT institutions. SFT schools, in general, had active services when they provided a type of medical care that was not
available elsewhere (i.e., heart surgery, renal dialysis, or transplant surgery). For ordinary medical care, however, patients who could afford an alternative service were choosing to obtain their medical consultations at other hospitals rather than go to SFT teaching hospitals. The reaction of several universities has been to investigate prepaid medical plans and other health plans to establish a population of patients who would serve as teaching material, and who would also pay in advance for their own medical care. Regrettably, there is nothing about advance payment that will change the disinterest that many medical school faculty members exhibit as they care for the sick. For an advance payment plan to succeed, it will be necessary to adjust the motivational influences under which faculty members operate. When this adjustment has been made, paying patients will come in abundance to the teaching hospital, and participation in health plans will become inconsequential.

FINANCING MEDICAL SCHOOLS

Anecdotal fiscal data were obtained from several institutions to illustrate the profound effect of economic motivation on the faculty's behavior. The total income from regular clinical departments at one major SFT institution was $90,000 per annum; that sum reverted to the dean's office. Under a policy enunciated by a new dean, 25 percent of this fund was turned back to individual departments for support of professional expenses such as travel, dues, and subscriptions for individual faculty members. Within three years, the private practice income increased 7.7-fold.

\[\text{In 1925, Flexner was surprised to learn that where surgical fees were formerly as high as $12,000, an entire school under the strict full-time system generated only $10,000 per annum [8-10]. Considering the much larger size of modern departments, and the effect of inflation, it would appear that today SFT faculty members have even less interest in seeing patients than they did a half century ago.}\]
or $700,000 per year. One department was able to hire six new faculty members with the overage. The recognition by the administration of motivational influences resulted in the creation of income from a "virtual endowment" of 17.5 million dollars ($700,000 represents a return of 4.5 percent from a balanced investment fund of that amount).

Three of the GFT schools selected for this survey have departments of surgery that are generally considered to be among the most outstanding in the Nation. The excellence of the schools is shown by 1) the largest amount of extramural grant support in the survey, and probably in the Nation (data from IMPAC, National Institutes of Health), 2) the highest representation of scholarly societies in the scientific programs over a 5-year period (data from this study), and 3) the high fraction of residents who enter academic medicine. Each department appears to acquire and retain outstanding faculty members by using this "virtual endowment" principle. An educated guess based on the amount of clinical activity, and on the number of full-time faculty members, suggests that the income taken out of the economy to support the individual and other activities of the department may represent a virtual endowment of 50-million dollars. Interestingly, one of these departments receives negligible support from the university.

In contrast, another institution, which had a thriving teaching service at an affiliated Veterans Administration hospital, ruled that the $50.00 consultation fee paid to faculty members for visits be returned to the dean's office. Within several years, the quality of the house staff, the effectiveness of teaching service, and patient care deteriorated profoundly.

Two deans spoke of attempting to duplicate the success of the private clinics that appear to support excellent programs for research, teaching, and patient care on income generated from practice income. It was clear that the deans
were unaware of the economic motivation built into the operation of clinics that, on the surface, appear to be SFT. Although the schemes are kept highly confidential, they include such plans as awarding points for patients operated upon, patients referred to clinic internists, papers published, and visiting professorships. Year-end bonus payments are then made on the basis of points accumulated.

QUALITY OF EDUCATION

The overemphasis on research, the denigration of clinical activities, and the introduction of an elective curriculum have already had a measurable effect on the quality of medical education in one school. Several years ago, students from this institution scored among the top schools in the Nation in the grades achieved by the school's students on examinations of the National Board of Medical Examiners. Recently, the school's students scored among the poorest performing schools.

AN ALTERNATE HYPOTHESIS

It might be argued that the behavioral characteristics of the SFT faculty revealed in this study were due, not to the lack of economic motivation, but to the high-level of intellectual motivation. Thus, it might be said that individuals with a high level of intellectual motivation naturally select SFT institutions, whereas those individuals who are economically motivated end up at GFT institutions. One institution in the survey offered a unique opportunity to test this hypothesis. Computerized records of clinical activity, plus a change in institutional policy, permitted the behavior of the same individuals to be observed continuously over a period of years under both the GFT and SFT systems of remuneration. The school formerly paid salaries that were low as compared to others, but individuals were permitted to supplement their income by clinical practice. Several years ago, an optional SFT system was distributed in which the
faculty member was guaranteed a salary of from 150 percent to 180 percent of the GFT salary (depending on academic rank), provided that he returned all fees from private practice to a dean's fund. The fees from private practice for the group of 28 medical and surgical specialists who elected SFT is now $1137 per man, per annum ($2540 for surgical specialists, and $903 for non-surgical specialists). Although no figures are available on the total income of GFT faculty, the income can be estimated from the ratio of hospital admissions per annum for the SFT and GFT groups obtained from computerized records. In the same controlled environment, GFT faculty members averaged 7 to 11 times as many admissions as SFT faculty members (depending on specialty). More importantly, the fraction of the group who were present through the change in policy elected to become SFT members, and showed an abrupt cessation of clinical activity. The dean has announced that in the future, SFT faculty members will be required to earn their supplementary salary.

It is not reasonable to expect intellectual motivation to be affected by a school's economic policy change. Therefore, it is not intellectual motivation, but rather a lack of economic motivation that causes SFT faculty members to neglect clinical medicine. The alternate hypothesis is rejected.

CONCLUSION

Without an economic incentive, the clinical faculty of medical schools will not accept personal involvement in the care of the sick if they have any reasonable alternative that permits them to maintain their self-respect.

V. SUBJECTIVE RESULTS

The real objective of the author's interest in this subject does not concern economics. The author's primary
concern is the quality of medical care that is being taught to the current generation of students. The quality of medical care will affect medical care in our country for a generation to come. There is only one purpose for a medical school: the instruction of undergraduate and graduate students of medicine in the care of the sick. Research creates the scholarly atmosphere in which this instruction is accomplished better. Clinical medicine cannot be taught on an objective basis like the physical sciences. Since we do not understand the nature of the cognitive process, and the inductive reasoning process which characterizes "clinical acumen," the teaching of medicine is largely preceptorial in nature. The student acquires from his teachers, who serve as models, their methods of history-taking, physical examination, reasoning, acquiring knowledge, and relating to other human beings.

Do we wish students to expect their patients to become ill only at convenient times, excluding nights and Sundays? Do we wish them to learn, by example, that a history and a physical examination are unnecessary parts of the care of the sick? Should the student be led to believe that practicing medicine consists of intellectual gymnastics at the foot of the patient's bed three mornings a week, without accepting personal responsibility for the course of medical events? Is it acceptable that the physician's relationship with the patient is so impersonal that a stranger is sent to console the family, and to ask for an autopsy permission? Is an hour or two per week in clinical activities, summated over several decades, adequate to produce physicians of sufficient clinical stature who serve as models for the students? My answer to these questions is in the negative. The extent of disagreement with this viewpoint is a measure of the seriousness of the problem in medical education.

At the turn of the century, physicians were clinicians who had no interest in science. It was Flexner's dream to
create, for the clinical teacher, a scholarly environment in which the scientific method could be applied to clinical practice. Instead, we have developed scientists who have no interest in clinical medicine. The motivational influence necessary to achieve an appropriate balance between science and clinical practice are so manifest in the results of this study that no discussion is required.

VI. CRISIS OF THE 70s

An appreciation of the role of economic motivation in the performance of medical school faculty members is essential, if we are to deal effectively with the three major problems that face medical education in the coming decade: 1) quality of medical education, 2) financing medical education, and 3) delivery of health care. The current medical crisis originated 30 years ago. The costs of medical education 30 years ago were so high that they could not be supported by either endowment, or by student fees. Society viewed medical education as a benefit to the individual rather than to itself, and therefore, medical education did not deserve public support. Organized medicine feared that federal control might accompany federal support of education. Therefore, the conscious decision was made by an influential few to support medical education obliquely through research grants, because both Congress and the public viewed a medical discovery as a benefit to all people.

Some medical schools employ grant funds to create a better scholarly atmosphere in which to teach about the care of the sick, to build a faculty in depth, and to make scientific contributions that were always considered to be of secondary importance to the school's primary mission—educating physicians. Other medical schools used grant funds to develop clinical departments numbering over 100
full-time physicians, who did superb basic and applied re-
search, but these physicians demonstrated little interest
in the care of the sick (invariably SFT schools). A third
group of medical institutions failed to compete successfully
for research grants, and have not been really influenced by
the grant program.

The economic conditions in the Nation that have required
severe reductions in the grant program have had little effect
on medical education in the first group of medical schools.
Research has been curtailed, but the faculty is supporting
itself in the practice of medicine. The second group of
medical institutions has lost the grant support for its
faculty, and now suffers both a fiscal crisis and a shortage
of clinical material. These SFT schools have unhappy rela-
tions with the patient community and with the referring
physicians, and lack the clinical material to teach and
support their faculty members. Failure to appreciate the
role of economic motivation in the performance of medical
school faculty, and to keep in mind the primary objective
of the university medical school, is in large measure re-
ponsible for the severity of the crisis.

It is curious that the university, whose principal
mission is teaching clinical medicine in a scholarly en-
vironment, should suddenly become interested in the delivery
of health care. The answer regarding this interest in the
delivery of health care seems to be the statement given by
Willy Sutton, the often apprehended bank robber, when he
was asked why he insisted on robbing banks; "Cause that's
where the money is!" The enthusiasm for participating in
prepaid health schemes at several universities that were
surveyed was related to the severity of their fiscal crisis,
and to the shortage of clinical material. In turn, these
problems were related to the faculty's unwillingness to give
personal medical care.
To this observer, it appears that academic medicine is attempting to re-establish itself by using these health care plans to capture a consumer group to replace those groups they have lost through free clinics. Could anyone be so unfamiliar with the character of the American consumer as to assume that he would accept the impersonal type of medical care found in this survey when more personal care is available at the same cost, or at lower cost elsewhere? Only when university medical centers have eliminated the demeaning nature of their outpatient departments, and deliver a type of medical care that is acceptable to the consumer, will the centers be able to compete effectively in the provision of prepaid health services. Once these improvements have been made, the shortages of finances and clinical material will disappear. It then becomes inconsequential whether or not university medical centers participate in such schemes.

The "delivery of health care" is about to be seized as a substitute for "research," and will become a raison d'etre for the medical school. Perhaps we will never learn.

VII. LEADERSHIP

No asset is more valuable than appropriate leadership in solving the problems that presently face medical schools. Deans, but more particularly department chairmen, must have a clear concept of the primary mission of the medical school. It is important to consider the value judgments individual faculty members place upon care of the sick, research, a scholarly environment, delivery of health care, and interest in the social problems of the day. Teachers of medicine influence the attitudes of 10,000 medical graduates each year—not by what they say, but by the examples they give.
There is a need to appreciate the attitude expressed by Dean Sherman M. Mellinkoff on my own school [11]:

Many a doctor in academic medicine, or medical educator in an administrative position, tends to belittle "clinical research" to deny what the clinician does best and to deify "basic research" as though the ultimate objective of medicine were not human betterment, but that of the winning of Nobel prizes. This trend is a sad one, and fortunately not universal, for it tends to encourage shabby imitations of profound basic research on the one hand, and the illusion that clinical excellence is acquired in the laboratory on the other.

It is incumbent upon the chairmen of clinical departments to conduct a critical self-examination. They must learn to manipulate the motivational influences imposed upon the faculty in such manner that the department fulfills its obligations well. Lester Evans stated [12]:

The answer lies not so much in the manipulation of the organization and operational pattern, but rather in the individual and collective attitudes and behavior of the teachers and students who constitute the university.

If one substitutes for "manipulate the organization and operational pattern" the words, "manipulate the curriculum," one has located where much of the administrative effort of our medical schools has gone in recent years. It is interesting to conjecture what would have happened if the same amount of energy had been expended in manipulating the attitudes and behavior of the teachers as revealed in this study. But, then, it is difficult for us to recognize our own attitudes and behavior when we are continually operating in a frame of reference that we ourselves have constructed. As John Gardner said,

Most organizations have developed a functional blindness to their own defects. They are not suffering because they cannot solve their own problems, but because they won't see their problems. They can look straight at their faults and rationalize them as virtues or necessities [13].
VIII. CONSTRUCTIVE APPROACHES

The first step in a constructive approach to solve the medical school problem is to separate the roles of federal funding, conceptually, if not in fact, used to support medical research and medical education. In the 20 years since the federal research grant program was initiated, the climate of medical schools has changed. It is now generally recognized that neither endowment funds nor student fees can pay the high costs of medical education. Public opinion, and Congress now appreciate the fact that medical education benefits society, and not just the individual. The general support of medical education should be based upon the individual school, rather than upon permitting those institutions that have already acquired a high level of research competence to acquire all future funds. The support for medical education must be constant, independent of economic and political vagaries. Medical education is a national resource to be nurtured like the federal highway system, the navigable waterways, and the national forests.

Research in the health sciences will be supported because society places great value upon discoveries that promote human welfare. Research will never be supported at the geometrically accelerating rate that has characterized it in the recent past, because within a few years medical research would consume the entire gross national product. Research support may be expected to vary with the mood of the public, the economic status of the Nation, and with the return on the investment of the research dollar. Research institutes should operate as part of university medical schools because of their synergistically beneficial effects.

The annual expenditure that society makes in medical education and in research has established education and research as major economic resources. All other major systems in our society have profited by the application of motivational
research, and by the application of systems analysis to determine their cost-effectiveness. Medical education, patient care, and medical research are surrounded by an aura of mystery that has enabled us to refuse to admit that value judgments can be assigned to what we do, and to how we do it. These judgments can and should be made.

We would benefit from the type of systems analysis that has been applied to so many other segments of our society, specifically:

1) **Definition of goals:** What is the purpose of our medical plant? What fraction of it should be assigned to education, to research, and to patient care?

2) **Identification of yardsticks to measure our effectiveness in meeting these goals:** The 18 variables measured in this study are examples. Does the outpatient department contribute to medical education? Does an elective curriculum produce a better doctor, or a better investigator? How are the variables measured?

3) **The application of available techniques of motivational research, and of systems analysis to identify those factors that can be used to manipulate our ability to achieve the goals.**

4) **The application of control systems to optimize the use of our resources in achieving the goals:** The present study is an example of this control system approach. The methods by which a faculty member is paid determines how he spends his time, how hard he works, the example he presents to the students, and other important items in the operation of a medical school. Policies on academic promotion, ceilings on income, and hospital bed control are powerful tools in the hands of wise administrators.
Systems analysis does not provide answers, but only provides the information that can be used as a basis for logical decisions. Humans must select goals and place value judgments on such things as teaching, patient care, and research. Systems analysis shows that medical faculty performance is determined by how faculty members are paid. How they should be paid is a human judgment determined by what one believes is the goal of a medical school.

VI. SFT OR GFT?

This study reveals serious defects in the strict full-time system. It is clear that academic physicians, unless economically motivated, will not assume the emotionally and physically exhausting role of providing personal medical care. I have no intention, however, of claiming superiority for one type of faculty remuneration over another. It must be recalled that the institutions involved in this study were a selected group of outstanding schools of medicine. It is quite possible that the evils of economic motivation spreading through the country exceed those evils caused by a lack of economic motivation. Many other schools, perhaps a majority, operate largely on the services of a volunteer or part-time faculty. Existing in a pre-Flexnerian condition, these schools would benefit greatly from the introduction of a full-time system of some type.

The author makes no apology for the intentional bias introduced in this investigation by selecting fine institutions. Only by studying the best can we identify those characteristics that generate excellence. Little would be gained by examining institutions still suffering from the defects revealed in the Flexner Report.

Some medical schools have attempted to achieve a balance by appointing one or two full-time faculty members in each
department, balanced by a large clinical staff that uses the university's prestige, facilities, and support to their own ends. These institutions sell their souls cheaply. It is apparent in the data provided that an outstanding school requires a group of 50 to 150 clinicians who devote 35 hr a week to teaching, administration, and research apart from their other clinical activities. If the university is not receiving these services in return for the use of its facilities, it is not receiving its just due. Too often, myopic administrators covet the practice income of their clinical staff without realizing that it would disappear under a strict full-time system. A high order of genius is required to design a viable equilibrium between the interests of the university and the faculty clinician. One can only sympathize with those universities that do not have a university hospital. They seek excellence, but they have nothing to barter for it.

The relative amounts of economic and intellectual motivation that are necessary to produce an optimum balance of faculty attitudes and performance will vary widely from school to school. It will depend upon local tradition, relation of the school to the community, availability of clinical material, finances, and upon the medical specialty involved. The balance between two motivational forces will continually change as our methods of delivery of health care change in the coming decades. We need more, not fewer, professors in the clinical departments, whose investigative efforts are uninterrupted by clinical responsibilities. The leadership and image of a clinical department must, however, be established by the physician who, by both word and example, indicates that nothing is more noble than to give one's personal freedom and energies to the care of sickness in his fellow man.

The conflict between intellectual and economic motivation establishes the critical lines of tension in academic
medicine. Both influences are inherently valuable. This tension will never be resolved, and never should be resolved. Failure to accept this reality has led to a lot of nervous indigestion and unnecessary commotion.
REFERENCES


