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An Examination of the Background and Origin of the Phelps-Stokes Educational Commission to Africa, 1921-1922

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Introduction

A review of the literature on educational and political development in Africa indicates that seldom does an author on the subject not make mention of the Phelps-Stokes Educational Commission Report, *Education in Africa*, published in 1922. To find it variously described as ". . . the most important initial factor in bringing about . . . an educational Renaissance in Africa";[1] ". . . the book of the century. . .;"[2] and ". . . an important landmark in the development of education in Africa,"[3] challenges one to seek beyond passing references and glowing tributes for insights into the motivations and purpose of the Commission and its sponsors, for with the benefit of historical prospective, it is clear today that the early 20th century was a time of paternalism in its approach to the problems of black men and that undoubtedly, the Phelps-Stokes Commission was a product of its time.[4]

When in 1919, the joint proposal by the American Baptist Foreign Missionary Society and the North American Foreign Missionary Con-

[1]T. Walter Wallbank, "The Educational Renaissance in British Tropical Africa," *Journal of Negro Education* III (January 1939): 110.

[2]Kenneth James King, *Pan-Africanism and Education: A Study of Race Philanthropy and Education in the Southern States of America and East Africa* (Oxford: Clarendon Press, 1971), p. 98.

[3]H. F. Makulu, *Education, Development and Nation-Building in Independent Africa, A Study of the New Trends and Recent Philosophy of Education* (London: SCM Press Ltd., 1971), p. 22.

[4]Richard Heyman, "The Initial Years of the Jeanes School in Kenya, 1924-1931," in *Essays in the History of African Education*, ed: Vincent M. Battle and Charles H. Lyons (New York: Teachers College Press, 1971), p. 105.

ference that a commission be appointed to make a study of education in Africa, was accepted by other international boards, a watershed in the long history of Protestant missionary education in Africa was reached. This decision indicated the extent of a concern over and disillusion with the wholesale transfer of the educational conventions of Europe and America to the peoples of Africa.[5] It also indicated a serious questioning of the whole pattern of missionary operations that had been adhered to by the Protestants through the greater part of the 19th century. Believing that the cause of Christianity could be best served by early conversions, the missionaries placed strong emphasis upon the training of young Africans by giving to them a limited, western, literary education that would help make them into instructed and proven congregations. Hence, in Africa at the turn of the century, there operated "comity agreements" between the numerous branches of Protestant denominations engaged in mission work and education, whereby, to avoid competition, a mission located within a given area, was recognized as exercising a paramountcy of interest and control over activities conducted and tribes living within it. In time, a denomination might operate numerous mission stations and preaching posts to which were attached elementary and primary schools, dispensaries or a central hospital, and occasionally, training centers.[6] The policy of the colonial administrations was to allow the missions to carry out their educational work with practically no supervision or regular financial support.[7] Often, the result of such an arrangement was that certain tribes within a designated area enjoyed educational advantages and social services over others in a different area where the mission's resources might be limited.

In the eyes of the natives, Christianity came to be equated with a more attractive way of living which, in turn, was predicated upon western knowledge or education. Thus, while the original missionary motivation of education was evangelistic—the presentation of the word of God to the people as the key to salvation by teaching them to read the Bible—the desire and demand for education by the Africans placed an increasingly heavy burden upon the missions.[8]

If and when economic development of the area occurred, a variety of entrepreneurs and administrators moved in with additional requirements for local workers who were able to read, write, and keep accounts.[9] Now the African hunger for education became insatiable. Learning was seen as the escape route from the old tribal discipline and manual labor. Education symbolized power and the authority and privilege enjoyed by the white

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[5]Thomas Jesse Jones, *Education in Africa. A Study of West, South, and Equatorial Africa by the African Education Commission under the Auspices of the Phelps-Stokes Fund and Foreign Mission Societies of North America and Europe* (New York: Phelps-Stokes Fund, 1922), pp. xii, 16.

[6]Makulu, *Education, Development and Nation-Building*, pp. 7–9.

[7]Jones, *Education in Africa*, p. 90.

[8]Makulu, *Education, Development and Nation-Building*, pp. 10–12.

[9]Leonard J. Lewis, *Education and Political Independence in Africa* (Edinburgh: Thomas Nelson and Sons Ltd., 1962), p. 85.

models. The pressure on missions to provide education was greater every year as it became accepted fact that formal schooling was a much broader process than the teaching of the Scriptures and the rudiments of the three R's. Other subjects such as geography, history, literature and more sophisticated mathematical skills were necessary for development and advancement.

The early years of the 20th century found the colonial governments continuing to encourage the missions to provide education but at the same time, becoming involved themselves in the education of the African when faced with demands for official responsibility in the construction of more facilities and the enforcement of standards and policies. In British West Africa where educational progress, (if exemplified by a major increase in the establishment of schools, including some for secondary education), could be noted, controversy between the missionaries, the government, and the European settlers over the objectives of native education raged with little attention to what the African himself wanted. The missionaries still viewed training for church membership and service as the major educational objective while colonial officials supported the purpose of turning out Africans who would be useful in the administration of the territory and the community. The European settlers, however, fearful of competition for jobs and demands for equality, maintained that education should not go beyond encouragement of the Africans to be good servants.[10]

Ironically, pressures on the missions to provide education were accompanied by rumblings of dissatisfaction with their programs and procedures. Critics declared that the missions' interdenominational competition had an adverse effect upon the Africans; that they confused the people by destroying their traditional beliefs while not offering them morally sound replacements or substitutes; that the denominations were guilty of rushing into remote areas simply to gain converts after which they established "third class" schools that were without adequate resources or trained teachers. Finally, some of the religious sects were accused of being subversively critical of the government—"even within the hearing of the natives."[11] The charge that the mission schools provided only a literary education and taught no practical skills was voiced as the reason why the educated African considered himself too good to work as a farmer and aspired to white collar occupations. This was also the explanation as to why it was that ". . . after Africans have been to school, they are not so amenable."[12]

Even as the missionaries defended themselves vigorously with the counter-argument that it was because of insufficient government financial support and uncoordinated standards of supervision and inspection that "third class" schools operated, they feared that the true intent behind the

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[10]Makulu, *Education, Development and Nation-Building*, pp. 13–18.

[11]Franklin Parker, *African Development and Education in Southern Rhodesia* (Columbus: Ohio State University Press, 1960), pp. 78–79.

[12]J. W. C. Dougall, "The Case For and Against Mission Schools," *Journal of the Royal African Society* XXXVIII (January, 1939): 91.

campaign of criticism was a government take-over of teacher training, and eventually, all African education from them.[13] As of 1918–1919, missionary education seemed in disarray after three quarters of a century or more of struggle to provide undifferentiated western education to a backward people. It was at this point of frustration that the American proposal for an investigative study came to the attention of the British missionary boards. Quickly they realized the advantages that would derive from cooperating with and profiting from a project based upon American experience and sponsored and directed by the organization and individual who were considered shining luminaries in Negro education.[14]

In the United States, the names, Phelps-Stokes Fund and Thomas Jesse Jones, were synonymous with southern Negro education. Established in 1911 in accordance with the intructions in the will of Miss Caroline Phelps Stokes that the income from one million dollars be administered by trustees ". . . for the education of Negroes, both in Africa and the United States,"[15] the Phelps Stokes Fund devoted its attention to matters of Negro education within the United States, prior to 1919. From the beginning, it sought and utilized the advice and opinions of Booker T. Washington who occupied the position of being the recognized consultant on the channeling of philanthropic aid and interpreter of what was educationally feasible in the South as far as the Negro was concerned. On the recommendation of Washington, the Phelps-Stokes Fund in 1913 underwrote a survey of all Negro schools in the South which was to be done in collaboration with the Federal Bureau of Education and directed by Thomas Jesse Jones, the Bureau's "specialist in the education of racial groups," and a staunch believer in the reigning Hampton-Tuskegee philosophy of special Negro education.

The result of Jones' next three years of school visitations and compilation of evidence was an impressive two-volume report in 1917, entitled, *Negro Education: A Study of the Private and Higher Schools for Colored People in the United States*.[16] Although destined to be yet another unpopular issue in the controversy waged between Booker T. Washington, Robert R. Moton, and W. E. B. DuBois over the proper course of Negro education in this country, the report established Thomas Jesse Jones' reputation in the white sector as "an authority on Negro education."[17]

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[13]Parker, *African Development and Education*, pp. 21, 43.

[14]King, *Pan-Africanism and Education*, pp. 21, 43.

[15]Edwin W. Smith, *Aggrey of Africa, A Study in Black and White*, (Freeport, New York: Books of Libraries Press, 1971), p. 143.

[16]King, *Pan-Africanism and Education*, pp. 30–33.

[17]As early as 1906, Washington and DuBois represented rival schools of thought on Negro education: the industrial and the literary; and on Negro political involvement: nonparticipation and activism. Robert R. Moton succeeded to the presidency of Tuskegee Institute following Washington's death in 1915, thereby inheriting the founder's imperative and philosophy. W. E. B. DuBois, "Negro Education," *Crisis XV* (February 1918): 177; "Thomas Jesse Jones," *Crisis XXII* (October 1921): 254; Wallbank, "Educational Renaissance," p. 110.

His recommendations were a reaffirmation of the basic Hampton-Tuskegee philosophy that education for the Negro should be of practical value and strictly governed by the conditions of Negro life in the South. Rather than in competition with whites in political and professional roles, the Negro's education should find its inspiration and fulfillment in the rural communities and in agricultural and industrial training. Although the report was couched in such sociological and educational phraseology as "primacy of rural needs"; ". . . curricular reform . . . along indistrial and domestic lines"; ". . . community consciousness;" and "adaption of educational activities," it clearly revealed that Jones had successfully evolved a program for industrial and agricultural education based upon standards adapted to special Negro needs. This was the type program that met the approval of Northern philanthropists and Southern whites in the United States.[18]

Needless to say, the examples, *par excellence*, of the implementation of the recommendations in *Negro Education* were Hampton and Tuskegee and Thomas Jesse Jones enjoyed a long and influential association with both schools. Although the former was the parent institution, it was Tuskegee that was more widely publicized in Europe and Africa during the first decade of the 20th century. Since Booker T. Washington's initial visit to Great Britain in 1899 and the arrival of three Tuskegee graduates and one faculty member in Togo, in 1900, to train Africans in cotton culture and experimentation in cotton breeding,[19] Tuskegeeism had come to be interpreted as all things to all of those who were concerned with different approaches to the education of the black man in Africa. To the missionary forces it meant an educational formula with which to fight the urbanization of the natives; a school life that brought compensation for a primitive home; and the kind of practical instruction that was suited to the natives' needs. To colonial administration, Tuskegeeism's design could prevent the political growth of Africans while increasing their value to the economy. Visits to Tuskegee between 1902 and 1914 by foreign government educationists and dignitaries strengthened the conviction in official circles that instead of an oversupply of "clerks, mission boys and black Englishmen," what was needed in Africa was a supply of workers, planters, plantation hands, miners, and seamen. The solution lay in the acceptance of a redirected approach to native education that would be a compromise between the "trade training" proposals of the mid-19th century that envisioned the creation of a strong middle class of African entrepreneurs, and the more conservative view that an industrial education should be designed to make the Africans an "improved peasantry" through practical training. Many of these British administrators, along with missionary leaders, also met and established contacts with Thomas Jesse Jones during this period and to

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[18]King, *Pan-Africanism and Education*, pp. 34–43.

[19]Louis R. Harlan, "Booker T. Washington and the White Man's Burden," *American Historical Review* LXXI (January, 1966): 442–443.

them, he expressed his interest in applying his principles and ideas on Negro education in this country to foreign fields.[20]

The advent of World War I placed in abeyance prospects for educational reforms in Africa. When over, one of the results of the conflict's impact was an upsurge of interest and a willingness by the colonial governments to share more of the responsibility for education.[21] Africa's war experience demonstrated the future inevitablility of the interrelationship between education, economic development, and political development. It could be a stimulus to economic profits by introducing more efficient industrial and agricultural techniques to transform the natives into more productive workmen who, in turn, would have a greater desire for more goods for which they would work harder. Education had a vital connection with industry, trade, and markets.[22] A second reason for increased concern stemmed from the inauguration of the Mandate System in Africa. Under the supervision of the League of Nations, the control and administration of Germany's former African possessions were turned over to certain of the European colonial powers to be administered under the principles of "international control, trusteeship and the open door."[23] It followed that from 1926 and on, greater world attention would be focused on native problems in Africa and this new interest would compel the governments to review and improve their educational policies.[24] As stated by a British official:

> . . . because Great Britain is committed to a colonial philosophy based on Trusteeship, it is her obvious responsibility to utilize all those agencies, of which education is perhaps chief, which contribute towards raising the African in the scale of civilization.[25]

A third factor that accounts for the new attitude of the governments, especially Britain, was the need for counteraction against the radicalism and demands for self-determination that the political unrest of the war years bred in many young, mission-educated Africans. Memories of the John Chilembwe activities in Nyasaland in 1915 were still fresh in the minds of the Europeans and although no proven connection between that native uprising and the Seventh Day Adventist missionaries seemed to exist, a new hostility prevailed towards permitting native education to remain under missionary control.[26] It was politic, therefore, to take the position that:

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[20]King, *Pan-Africanism and Education*, pp. 43–53.

[21]L. Gray Cowan, James O'Connell, and David G. Scanlon, eds., *Education and Nation-Building in Africa* (New York: Frederick A. Praeger, 1965), p. 5.

[22]Frederick D. Lugard, *The Dual Mandate in British Tropical Africa* (London: Frank Cass and Co., 1965; reprint of 1922 edition), pp. 606–618.

[23]Raymond Leslie Buell, *International Relations* (New York: Macmillan, 1925), p. 329.

[24]Cowan, et al, *Education and Nation-Building in Africa*, p. 5.

[25]Wallbank, "Educational Renaissance," p. 106.

[26]George Shepperson and Thomas Price, *Independent African, John Chilembwe and the Origin, Setting, and Significance of the Nyasaland Native Rising of 1915* (Edinburgh: The University Press, 1958), pp. 323–355, 363.

> African education constitutes an important Imperial responsibility because it wields a fateful influence upon the political consciousness of the native. It is true that Great Britain is committed to a policy of progressively increasing the participation of the natives in governmental policy, but it is realized that the pace must not be too fast. . . . In Africa it is one of the roles of education to retard the creation of a vociferous, yet numerically insignificant, intelligentsia divorced from the great mass of their own inarticulate people, yet demanding impossible political concessions.[27]

Thus in November, 1919, when trustees of the Phelps-Stokes Fund adopted the proposal that "a survey of educational conditions and opportunities among the Negroes of Africa, with a special view of finding the type or types of education best adopted to meet the needs of the Natives be undertaken . . .",[28] they consolidated and implemented motivations that stemmed from the ambition of the Fund's Educational Director to extend to Africa his concept of an education adapted to the needs of a particular people; the hope of the missionary organizations for relevant educational reforms that would strengthen their control; and the desire of the colonial governments to take over and provide more practical education that would be to the economic benefit of both colony and metropole and contribute little to any incipient political consciousness of the subject peoples.

Conclusion

With Thomas Jesse Jones as chairman, the Phelps-Stokes Educational Commission included both men and women—European, American, and African.[29] It traveled in West Africa betwen August, 1920 and August, 1921. Its mandate was to ascertain the educational work being done in the territories toured; to investigate the educational needs of the people from the standpoint of religious, social, and health conditions; to cooperate in devising plans designed to meet the needs of the African; and to publish the full results of the investigation. In 1922, the report, entitled, *Education in Africa*, appeared in print. It contained such recommendations as:

1) Education in Africa should take into account the child's environment and the role that he is to play in society.
2) Education should be adapted to conditions of African life with greater emphasis upon appreciation for rural life.
3) Education should have a moral and religious basis.

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[27]Lugard, *The Dual Mandate*, p. 426.

[28]Jones, *Education in Africa*, p. xiii.

[29]The African member of the Commission was James Emman K. Aggrey of the Fanti Tribe, Gold Coast West Africa. He was educated in mission schools and later in the United States. Aggrey's friendship with Jones began in 1904 and it was one of mutual admiration. Jones' decision to include Aggrey on the Commission was based upon Aggrey's African origin, his ability as an observer, his broad training in sociology and education, and his "constructive" attitude towards racial relations. Smith, *Aggrey of Africa*, pp. 6, 148.

4) Greater utilization of tribal languages in education was essential.
5) Agriculture, health instruction, and physical education should have greater emphasis, followed by crafts and home economics.
6) Education should introduce new technological developments.
7) There should be closer cooperation between government and missions in clarifying objectives and educational planning.
8) The ultimate educational aims to be attained should be the training of the masses of the people and the education of native leadership.[30]

The Phelps-Stokes Commission Report would lead to the rethinking of educational policy and the beginning of "modern education" in Africa for the decades of the 1920's and 1930's. The British Colonial Office created an Advisory Committee on Education to respond to the challenge. From this body came two subsequent memoranda on education in British Tropical Africa that served as the basis for major educational reforms in 1925 and the decision to have a similar investigation conducted by the Phelps-Stokes Commission in East Africa, the following year.[31]

For the next fifteen years, "popular education" was stressed in Africa as efforts were made to introduce into the curricula studies that related to the natural environment and the needs of the African child's own community. Stories, folklore, tribal and traditional dances and handicrafts were focal points of emphasis. While such seemed innovative and progressive, and while education became increasingly the direct responsibility of government as it rendered greater financial support, what neither the Phelps-Stokes Commission had foreseen nor the colonial administrations anticipated, was to take place.[32] The interaction of educational change with economic development encouraged political development. The "native leadership" that the Commission Report spoke of figuratively in 1922, would become a part of the practical reality of the independence movement of the 1960's. "Adapted" education could not immunize the African from politics and nationalism.

If Thomas Jesse Jones and the members of the Commission were to return to Africa today, although confounded and astounded by a social and political transformation that they could not have imagined in the paternalistic and racist milieu of the 1920's, they might take comfort and pleasure from the knowledge that since 1962, as the new independent governments structured national systems of education, the demand for relevant source material prompted the issuance of an abridgment by the London Institute of Education of the Phelps-Stokes Report on *Education in Africa*.[33]

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[30]Jones, *Education in Africa*, pp. 11–43 passim, 90–92.

[31]Makulu, *Education, Development and Nation-Building*, p. 22; Cowan et al, *Education and Nation-Building in Africa*, pp. 7–8, 45–52.

[32]Makulu, *Education, Development and Nation Building*, pp. 20–21.

[33]William W. Brickman, "Tendencies in African Education," *The Educational Forum* XXVII (May 1963): 400.

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Singlet Molecular Oxygen in Biological Systems

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Introduction

Our interest in singlet molecular oxygen came about as a result of our continuing investigation of the mechanism of action of lipoxygenase, a dioxygenase enzyme, whose primary and secondary reactions have held out promise of industrial applications (1–3). Lipoxygenase catalyzes the oxidation of certain polyunsaturated fatty acids with *cis*, *cis*, 1, 4-pentadiene structure, to the corresponding optically active secondary hydroperoxides whose subsequent disproportionation may yield singlet molecular oxygen (4–5). We have recently attributed the lipoxygenase—mediated oxidative destruction of a wide variety of structurally— unrelated substances, to the ability of this enzyme system to generate singlet oxygen whose unusual reactivity ensures rapid oxidative degradation of these "pseudosubstrates" (1). The idea of singlet oxygen participating in biochemical reactions is a novel phenomenon with far-reaching implications in biology. In this paper we present a brief discussion of the nature of singlet oxygen and the biochemical effects of its reactions.

Electronic Structure of Singlet Oxygen

The nature of singlet oxygen might be better understood if the electronic configuration of normal (also referred to as triplet, ground state) oxygen is first considered. Figure 1 is the molecular orbital energy diagram for oxygen. This figure shows the atomic orbitals of two oxygen atoms combining to form the molecular orbitals of a ground state oxygen molecule. The $\sigma 2p$ orbital in oxygen is usually considered to be at a lower energy level than the $\Pi 2p$ orbitals. The molecular orbital energy diagram is in

agreement with the known experimental fact that the oxygen molecule has two unpaired electrons located in the antibonding molecular orbitals, Π^*2p_x and Π^*2p_y as shown in Figure 1. This has proved to be difficult to explain on the basis of valence electronic structures but with the molecular orbital theory it is quite straightforward. The fact that oxygen has two unpaired electrons (.O − O.) accounts for its biradical nature and ability to undergo reactions generally characteristic of molecules with unpaired spins. Usually the ground state of most molecules is a singlet (net electron spin of zero) while the excited state is a triplet (net electron spin of one). Oxygen behaves differently, exhibiting triplet and singlet features in its ground and singlet excited states, respectively.

If energy is imparted to the oxygen molecule either by its mode of formation or by appropriate excitation, the electronic configuration may change to form a new singlet state. Two singlet excited states which have been experimentally identified are $^1\Delta O_2$ and $^1\Sigma O_2$. Their electronic structures differ from that of normal or triplet oxygen ($^3\Sigma O_2$) in the distribution and orientation of the two electrons in the highest occupied molecular orbitals. This is shown in Figure 2. It can be seen that in the lower energy $^1\Delta$ state, the two unpaired electrons are now paired, occupy the same orbital and therefore have antiparallel spins (Pauli exclusion principle). In the higher energy $^1\Sigma$ state, the two electrons are still unpaired and occupy separate orbitals but are oriented in an antiparallel fashion ($\downarrow O - O\uparrow$). The first excited singlet, $^1\Delta O_2$, is less stable than the ground state oxygen by about 22.5 kcal/mole (emission at 1270nm). When more energy is imparted to the oxygen molecule, the state which corresponds to a level 37.5 kcal/mole (emission at 762nm) above the ground state may be observed. There is experimental evidence for possible interaction between molecules of $^1\Delta O_2$ or those of $^1\Sigma O_2$ and $^1\Delta O_2$ to form two more transient excited states with energies corresponding to 633 nm and 480 nm respectively. (6). The stoichiometry of these interactions and the energies of the resulting excited states relative to those of $^1\Delta O_2$, $^1\Sigma O_2$, and $^3\Sigma O_2$ are summarized in Figure 3.

The first excited singlet, $^1\Delta O_2$, is the most stable and studied of these excited states of oxygen. Therefore unless otherwise specified, future references to singlet oxygen should be interpreted to mean $^1\Delta O_2$. Table 1 is a summary of some of the chemical and physical methods used to generate singlet oxygen.

Reactions of Singlet Oxygen

Singlet molecular oxygen is sufficiently reactive to oxidize a variety of suitable organic acceptors. Particularly susceptible are the olefines and 1, 3-dienoid compounds which are oxidized to the corresponding hydroperoxides and endoperoxides respectively. Other types of organic compounds attacked by singlet molecular oxygen include enamines, polynuclear aromatic hydrocarbons, and such heterocycles as pyrroles, oxazoles, imidazoles and thiophenes. Table 2 illustrates some typical oxidations

with singlet oxygen. Oxidation of heterocyclic compounds and enamines is of vital concern since these are related to many biological substances. For example, *in vitro* studies have shown that chemically produced singlet oxygen can attack purine and pyrimidine bases, nucleosides, nucleotides and polynucleotides (14 – 16) all of which are components of nucleic acids. Similar studies made with several amino acids indicate that histidine, tryptophan, methionine, cysteine and cystine might be oxidatively altered by singlet oxygen (16). It is difficult to assess the importance of these reactions in *vivo* due to the short lifetime (10^{-6} – 10^{-5}s) of singlet oxygen in solution and the low concentrations at which it may be produced. If these reactions, however, do occur to a significant extent *in vivo*, they could certainly contribute to such phenomena as genetic damage and enzyme inactivation.

Possible Metabolic Sources of Singlet Oxygen

A discussion of singlet oxygen would be incomplete without mention of a related, equally reactive superoxide radical anion (0_2^-) which is a potential source of singlet oxygen (17) and whose production in animal cells is supported by increasing experimental evidence (18 – 22). Superoxide radical anion is a partial reduction product probably formed as a transient intermediate on the active sites of enzymes during mitochondrial electron transport to oxygen as well as during various hydroxylation and oxygenation reactions. One metabolic source of singlet oxygen for which there is sufficient experimental evidence is the oxidation of xanthine to uric acid by the complex flavoprotein, xanthine oxidase, during the catabolism of purines:

$$\text{Xanthine} + H_2O + O_2 \longrightarrow \text{Uric Acid} + O_2^-$$

The superoxide radical subsequently undergoes conversion to hydrogen peroxide by the action of superoxide dismutase enzyme

$$2O_2^- + 2H^+ \longrightarrow H_2O_2 + O_2 \quad (\text{or } {}^1\Delta O_2)$$

It is perhaps feasible to think in terms of a spontaneous *in vivo* conversion of O_2^- to ${}^1\Delta O_2$ in a one-electron transfer reaction, particularly in view of the fact that this reaction has been demonstrated *in vitro* (17).

White blood cells also appear to produce significant amounts of O_2^- during phagocytosis (22). Other presumably viable sources of singlet oxygen that could be important *in vivo*, include the reaction between O_2^- and hydroxyl radical (.OH) (23), the spontaneous decomposition of secondary aliphatic and aryl peroxides (24), and reduction of O_2 by enzyme cofactors such as flavin derivatives, nicotine amide derivatives and quinones (25). Hydroxyl and aliphatic peroxy radicals can be produced in animal cells; the former through the action of ionizing radiation on cellular water and the latter following lipid peroxidation particularly in Vitamin E-

deficient animals. Free radicals produced *in vivo* are frequently cited as probable contributors to the aging process (26,27).

Medical Aspects of Singlet Oxygen

Slightly over two hundred years after its discovery by Joseph Priestly, oxygen still remains a subject of intensive investigation for two major reasons: a continuing search for a satisfying explanation for photodynamic action and recent indications that singlet oxygen could be a participant in biochemical reactions of medical significance. Singlet oxygen may be involved in erythropoietic protoporphyria (EPP), one of several blood diseases characterized by acute photosensitivity of the diseased individual (28–30). EPP is a genetically inherited disorder in which the concentration of free protoporphyrin in the red blood cells is unusually high. Blood from EPP patients has been shown to be easily susceptible to photohemolysis, a process which is accompanied by photoperoxidation of erythrocyte membrane lipids (31). Recently Lamola, Yamane and Trozzolo (32) demonstrated the involvement of singlet oxygen in this membrane destruction process. While the search for a much more effective therapy continues, EPP patients are, with varying degrees of success, being treated by oral or systemic administration of β-carotene. The β-carotene is thought to ameliorate the photosensitivity by acting as an *in vivo* quencher of singlet oxygen and probably by functioning as a light shield too. (33–34). α-Tocopherol (Vitamin E), an effective singlet O_2 sink, has also been shown to protect erythorocytes *in vivo* from the photosensitivity characteristic of EPP. (35).

In new born infants (especially premature ones) with neonatal juandice, survival may depend on the ability of the body to make singlet oxygen when subjected to proper light therapy. Neonatal juandice is an enzyme-deficiency disease marked by an excess accumulation of bilirubin (27,36), a degradation product of hemoglobin. The missing enzyme catalyzes the conversion of lipid-soluble bilirubin to water-soluble bilirubin glucuronide, the form in which bilirubin is normally excreted. One promising treatment involves subjecting the patient to light of the same wavelength as the absorption maximum of bilirubin. The singlet oxygen produced in a consequent *in vivo* photochemical reaction in which bilirubin is the sensitizer, is thought to destroy the accumulating bilirubin (15).

Erythrocyte hemolysis associated with glucose-6-phosphate dehydrogenase deficiency in man is thought to involve singlet O_2. This belief is based on results of recent research. The first piece of evidence is the demonstration that catalase and superoxide dismutase, both oxidation protecting enzyme systems, can protect red blood cells from hemolysis. (37–38). The second, comes from spectroscopic studies which indicate that the O_2 bound to hemoglobin (Hb) during hemolysis of vitamin E-deficient erythrocytes by Hb-bound O_2, resembles singlet rather than ground state O_2 (39–40). While other oxidant species (O_2^-, .OH and H_2O_2) may be involved too in

this hemolytic destruction of erythrocytes, the role of singlet O_2 is novel and certainly deserves more investigation.

Several theories linking singlet oxygen with polynuclear aromatic hydrocarbon-induced carcinogenesis exist (30,41–42). The most acceptable of these, is one which proposes the specific binding of the polynuclear aromatic hydrocarbon to a site or molecule in the cell and undergoes some form of excitation producing singlet oxygen (17). The singlet oxygen generated is believed to cause the intracellular damage which eventually leads to tumor initiation. Other observations indirectly linking singlet oxygen to cancer include: (a) the ability of α-tocopherol, a singlet oxygen scavenger, to protect cells from dimethylbenzanthracene induced carcinogenicity (43), (b) the efficiency with which malignant cells can take up and bind to singlet oxygen sensitizers particularly hematoporphyrin (44) and (c) a direct link between skin cancer and photosensitization. Although these ideas are at best tentative, they must be taken into consideration in evaluating the unresolved question of cancer etiology.

There is evidence to indicate that the familiar scavenging process of phagocytosis by polymorphonuclear leukocytes (white blood cells)—an important line of defense for mammalian organisms against invading microbes, involves the generation of singlet O_2 and super oxide radical anion both of which function as the microbicidal agents (45). Krinsky (46) proved the participation of singlet oxygen in phagocytosis by demonstrating that with mutant strains of *Sarcina lutea* devoid of carotenoid pigments, phagocytosis by human polymorphonuclear leukocytes was much more efficient than with the carotenoid-containing wild type. Since carotenes are efficient singlet O_2 quenchers, he argues that the quenching effect of these pigments explains the observed difference in phagocytosis in the presence or absence of carotenoid pigments.

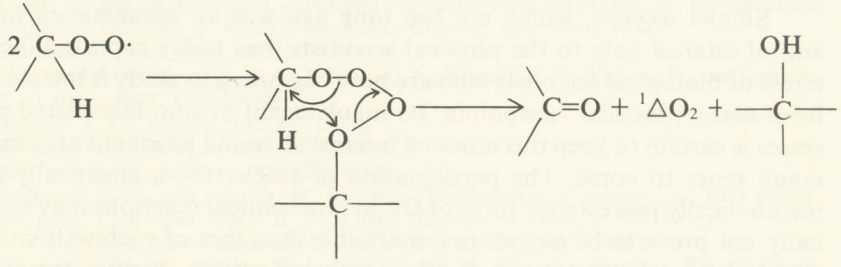
Singlet O_2 may be involved in rheumatoid athritis which is marked by accumulation of polymorphonuclear leukocytes in the synovial fluid of joints (47). Singlet O_2 is thought to act by oxidative depolymerization of hyaluronic acid, a vital component of the joint lubricant deemed essential for proper maintainance of the viscosity of the synovial fluid. McCord (47) argues that it is O_2^- which is the depolymerizing agent, on the basis of experiments utilizing xanthine-xanthine oxidase system, an established source of O_2^-, as his O_2^- generator during studies of synovial fluid stability. Pedersen and Aust (48) have shown that the O_2^- produced by the xanthine oxidase system can decompose to singlet O_2. It is therefore more likely, they argue, that singlet O_2 is directly involved in this disease. Of course as in phagocytosis, it is possible that both oxidant species (O_2^- and singlet O_2) are participants in the depolymerization reaction.

Singlet O_2 production in animal cells has already been noted. Vitamin E and other antioxidants protect the body from the deleterious effects of singlet O_2. However, if not trapped by a biological antioxidant, singlet O_2 can lead to lipid peroxidation to form hydroperoxides which are good free radical progenitors, Free radicals, on the other hand, have been linked with

the aging process (26–27). They appear to encourage aging by participating in reactions which initiate the formation of the age pigment, lipofuscin, an insoluble, fluorescent, lipid-containing granule known to accumulate in the brain, muscle and heart of aged persons (16). Accumulation of lipofuscin has been associated with memory and learning dysfunction, features characteristic of aged individuals.

Singlet O_2 in Enzyme Catalysis

Despite the prevailing thinking that an activated form of O_2 is involved in the action of some dioxygenases—enzymes that incorporate molecular oxygen into their substrates—no direct detection of singlet O_2 has been shown for any of these enzyme systems. Although the metabolic hydroxylation of aromatic hydrocarbons by the nonspecific liver microsomal enzyme systems has been shown to involve O_2^-, the hydroxylating ability does not appear to reside in singlet O_2 (49). Recently, however, three enzyme systems have been reported to produce singlet O_2 during their catalytic reactions. These are the xanthine-xanthine oxidase system (50), the linoleate-lipoxygenase system (1,2,51,52,) and the NADPH-independent adrenodoxin reductase system (53). Two of these, xanthine oxidase and the adrenodoxin reductase systems produce O_2^- as the primary oxidant species which subsequently dismutates to singlet O_2. Using such singlet oxygen sinks as tetraphenylcyclopentadienone and 1,3-diphenylisobenzofuran, we have demonstrated many times singlet oxygen-like oxidations when lipoxygenase acts on its substrate (54). The singlet oxygen appears to result from the chemical decomposition of the peroxide product of the enzyme reaction according to the following mechanism:



We think that the singlet oxygen produced accounts for the ability of lipoxygenase to oxidatively bleach carotenoid pigments, a reaction currently used in the baking industry to bleach wheat dough during the making of white bread. Improved dough properties are also achieved perhaps due to thiol oxidation in wheat gluten by the peroxide formed by lipoxygenase.

Anbar (55) has also reported a one-time detection of singlet oxygen during catalase or peroxidase—catalyzed decomposition of hydrogen peroxide, but he has not been able to reproduce his own findings nor have

they been confirmed by other workers. In the last few years several more enzyme systems have been shown to generate O_2^-, a potential source of singlet oxygen. It is likely that these enzymes may also produce singlet oxygen which in a typical aqueous environment in which most enzyme reactions are run, possesses an exceedingly short lifetime to be detected by presently available tools.

Singlet oxygen in the Environment

Recently scientists have expressed concern over the possible environmentally harmful effects of the chlorofluorocarbons, Freon 11 and 12 ($CFCL_3$ and CCI_2F_2 respectively), on the earth's protective ozone blanket. Perhaps not equally publicized in the popular literature are the harmful consequences of increasing formation of singlet oxygen in polluted atmosphere. It has been shown, for example, that olefines and aromatics of automobile exhaust may act as sensitizers via photochemical excitation to convert triplet oxygen to singlet oxygen (56). Atmospheric pollutants such as sulfoxides, phosphines, tertiary amines, alcohols, ethers and phosphines generally associated with industrial millieu, can react with ozone to form singlet oxygen (56,57). The singlet oxygen formed can exert its destructive effects by participating in a series of reactions which contribute to the further depletion of the stratospheric ozone layer (58) thus permitting increasing doses of harmful ultraviolet radiation from the sun to reach various forms of life on earth. This is predicted to lead to additional cases of skin cancer and severe climatic changes.

Conclusion

Singlet oxygen, which not too long ago was an academic curiosity and of interest only to the physical scientists, has today captured the interest of biological scientists who are now beginning to study it intensively from many practical viewpoints. Its involvement in vital life-related processes is certain to keep this renewed interest alive and productive for many many years to come. The participation of singlet O_2, a chemically and metabolically more active form of O_2, in biochemical reactions may eventually not prove to be any more remarkable than that of such well known metabolic intermediates as "active carbondioxide", "active formate", "active acetate" and "active phosphate".

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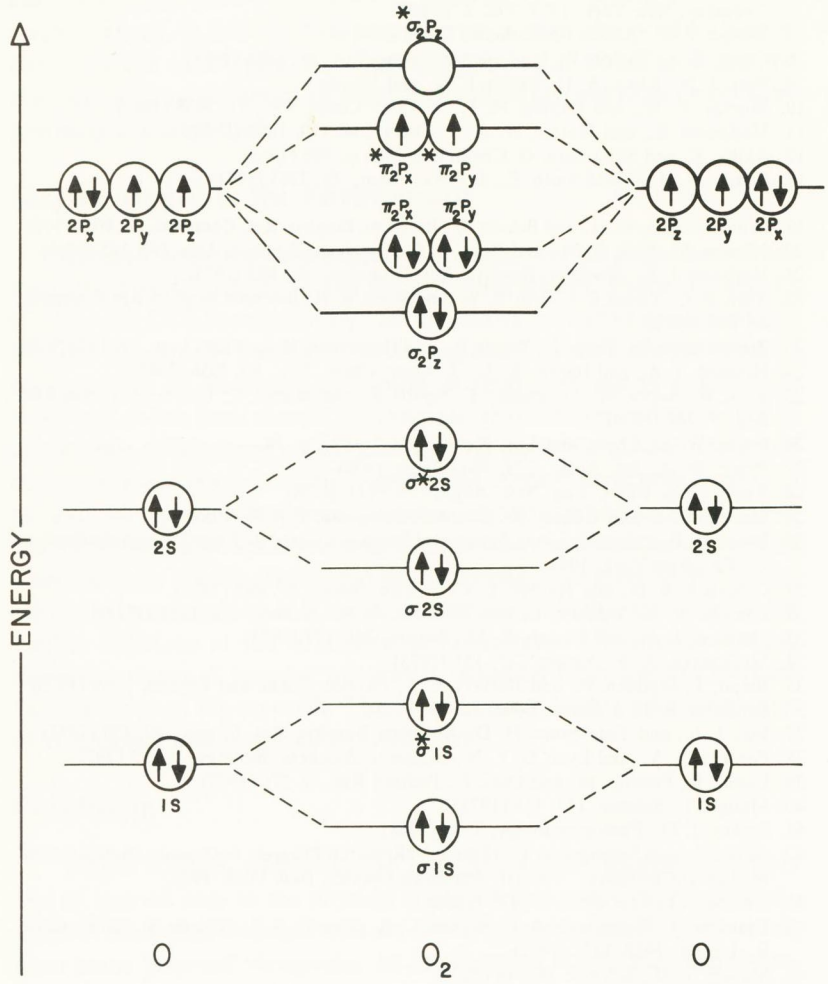


Figure 1

Figure 1 Electronic configuration of triplet or normal oxygen, $^3\Sigma O_2$. The circles are used to designate orbitals while the arrows and their directions signify electrons and their spin orientations respectively.

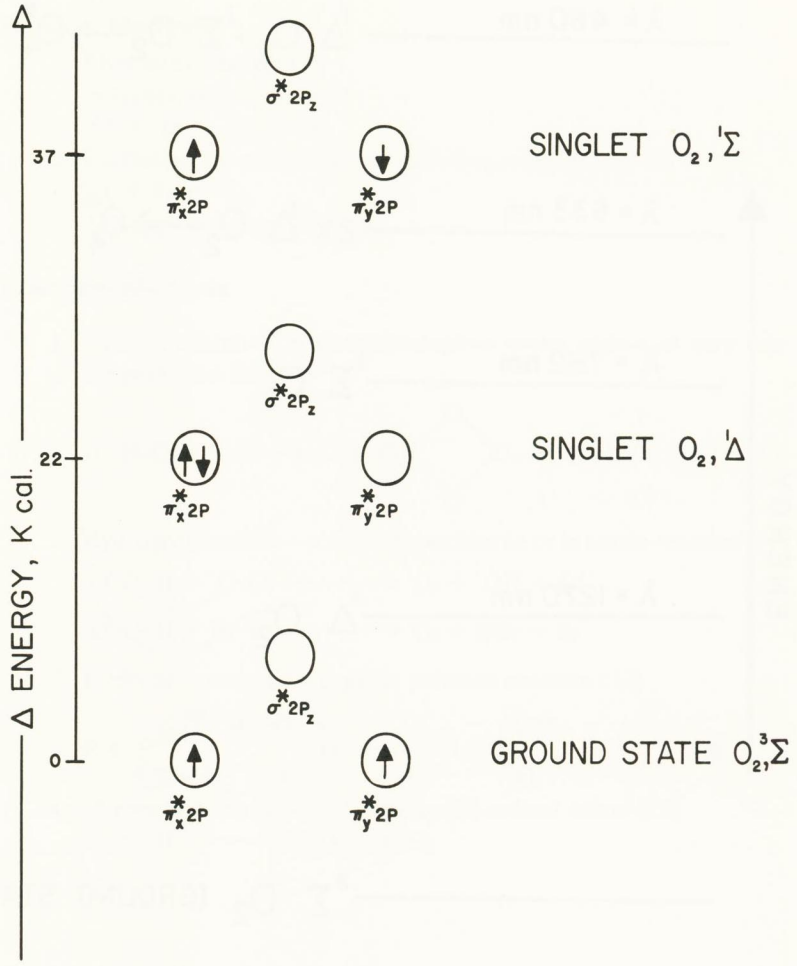


Figure 2

Figure 2 Electron distribution in the highest occupied orbitals of the ground, first excited, and second excited states of molecular oxygen. The notations Σ and Δ designate different electronic wave functions. The superscripts 1 and 3 denote singlet and triplet states respectively.

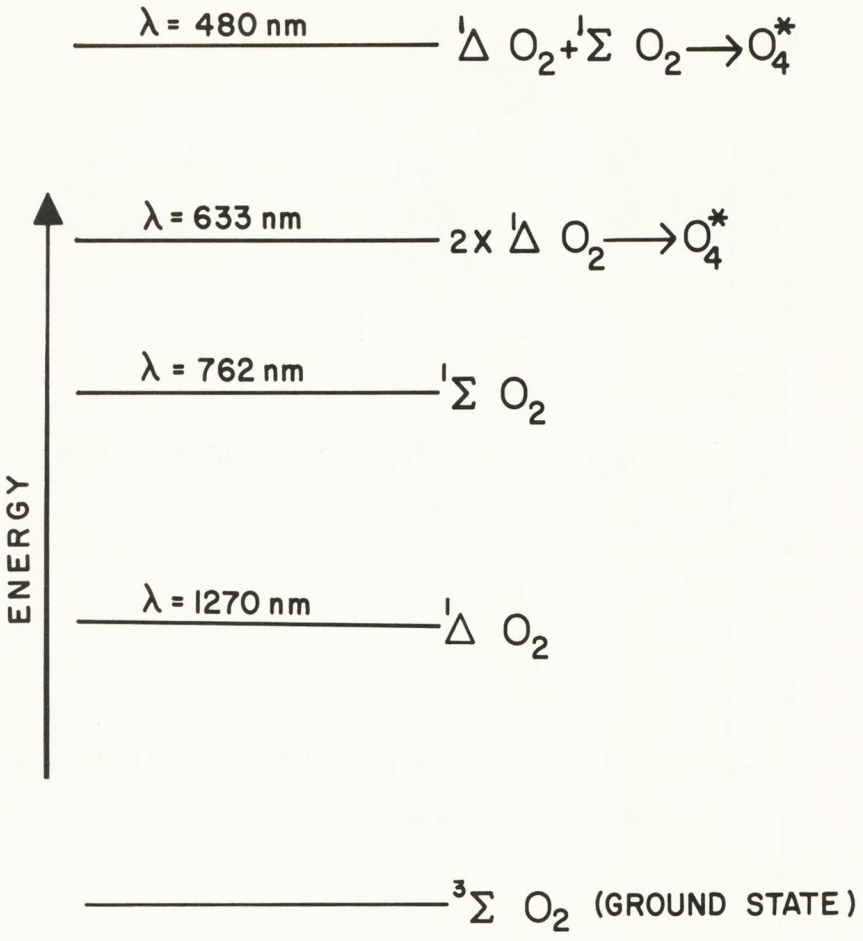


Figure 3

Figure 3 The relative energies of the various excited states of oxygen shown in terms of their wavelengths of emission. (Not drawn to scale).

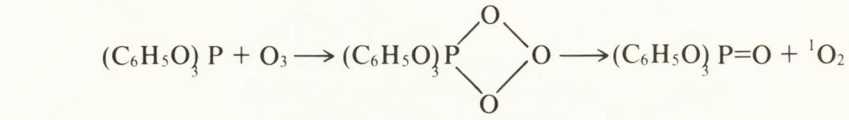
TABLE 1: Methods for Generating Singlet O_2

Physical Methods:

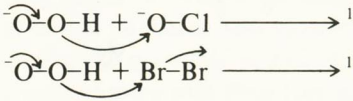
1. Photosensitization (7)
   ^1S (sensitizer) + $h\upsilon \rightarrow {}^3S^*$
   ${}^3S^* + {}^3O_2 \rightarrow {}^1O_2 + {}^1S$
2. Excitation by microwave or radiofrequency energy (8)
   ${}^3O_2 + h\upsilon \rightarrow {}^1O_2$
3. Atmospheric generation (9)

Chemical Methods

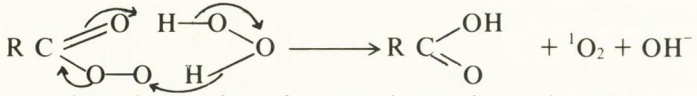
1. Decomposition of triphenylphosphite-ozone adduct at very low temperatures (10)



2. Hydrogen peroxide—sodium hypochlorite or bromine reaction (11)

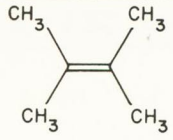
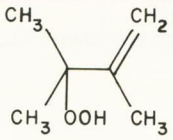
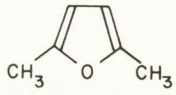
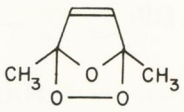
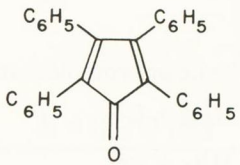
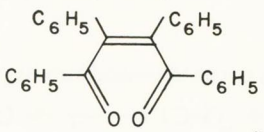
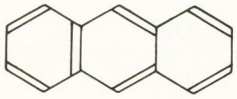
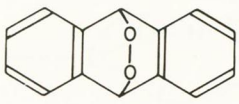
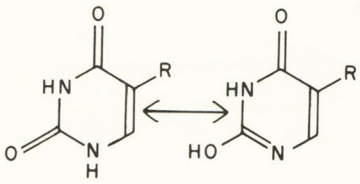
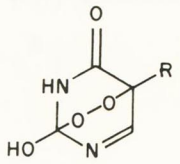
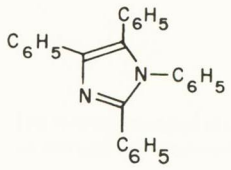
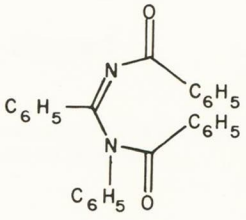


3. Hydrogen peroxide—organic peracids reaction (12)



4. Chemical dismutation of superoxide radical anion (13)
   $O_2^- + 2H^+ \longrightarrow {}^1O_2 + H_2O_2$

TABLE 2. Selected Oxidations With $^1\Delta O_2$

SUBSTRATE	PRODUCT	REFERENCE
		59
		59
		60
		60
		16
		61

Omission of the Conditional and Conditional Perfect Tenses in the Study of Modern Descriptive English Grammar

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A void exists in descriptive English grammar. The lacuna referred to is that which concerns two elusive tenses that are almost completely ignored in English grammar texts and appear, as if by magic, when English grammarians team up with their foreign counterparts to produce grammar books for students of foreign languages. The tenses in question are the *Conditional* and the *Conditional Perfect*. They are carefully excluded from the lists of simple tenses in English, which are limited (in nearly all instances) to: *Present, Past, Future, Present Perfect, Past Perfect,* and *Future Perfect.*[1] Admittedly, not every English grammar text was examined; however, a representative number of widely accepted texts were studied. The consensus is that no consideration is given to nor provision made for the two orphaned tenses. No attempt is made to suggest tenses in which the following examples would fit: *He said he would do it. They would not leave. He said that he would have done it. They would not have left.* These are valid expressions taken from standard English, and the verbs employed (*Would Do, Would Leave, Would Have Done, Would Have Left*) deserve being classified along with the traditionally accepted tenses of the *Indicative Mode.*

*Acknowledgements are due and gratefully tendered to Professor Bernice A. Reeves (Area of Languages and Literature, Florida A&M University) for her valuable assistance and for having made her library available for perusal.

[1]Thomas W. Harvey, *A Practical Grammar of the English Language*, revised ed. (New York: American Book Co., 1896), p. 99.

R. W. Pence and D. W. Emery, *Grammar of Present-Day English* (New York: The Macmillan Co., 1963), pp. 296, 297.

John M. Kierzek and Walter Gibson, *The Macmillan Handbook of English,* 5th ed. (New York: The Macmillan Co., 1960), p. 260.

Henry Shaw, *A Complete Course in Freshman English*, 7th ed. (New York: Harper and Row Publishers, 1973), pp. 73, 99.

There has been a decline in interest in the learning of foreign languages in the past five or six years. This unfortunate development is given no positive reenforcement by adding confusion to two of the most critical areas of foreign language study: tenses and conjugation of verbs; the mere mention of these evoke fear in the average student. Why, then, should we toy with our students of English and foreign languages by including the *Conditional* and the *Conditional Perfect* in texts designed for English speaking students of foreign languages and omitting them from texts designed for students of English. What is the student to think when he sees these tenses so clearly represented in his French, Spanish, and German texts and can find no reference to anything comparable in reputable English tests?[2] It is not as if the *Conditional* and the *Conditional Perfect* were fabrications conjured up by grammarians in an attempt to match segments of a bastard mode that existed only in languages other than English. In the foreign language tests there are no qualifications (implied or expressed) for their inclusion. On the other hand, there is usually no explanation for their omission in the English? What is the student to think when he sees these tenses so clearly following a precedent that was established many years ago? Do they not expect students of foreign languages to consult English grammar texts and students of English grammar to study foreign languages?

Varying degrees of credit should be given to the few descriptive grammarians who dare to admit to the logic of adding two additional verb forms to the sequence of tenses in English. Margaret Bryant states that it is reasonable for the past and future tenses to have a past and future of their own; however, she excludes them from her list because she says that they do not fit the scheme of English grammar.[3] Among the grammarians whose works were examined, Homer House and Susan Harmon come closest to establishing a precedent for the eight part scheme for simple tenses in English. According to them:

> The past-future tense, sometimes called the secondary future tense, is employed to represent an action as having occurred in the past as opposed to the present. In other words, the past future denotes future time to some past time expressed or implied. Should and would as the past tense forms of shall and will are the auxiliaries employed in the past-future tense.[4]

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[2]Laurel Turk and Aurelio M. Espinosa, *Foundation Course in Spanish*, 3rd ed. (Massachusetts: D. C. Heath and Co., 1974), pp. 421–423.

William S. Hendrix and Walter Meiden, *Beginning French*, 4th ed. (New York: Houghton Mifflin Co., 1970), pp. 427, 429.

Erich Hofacker and Richard Jente, *Complete College German* (New York: D. C. Heath and Co., 1939), pp. 312, 329–335.

Oliver W. Heatwole, *A Comparative Practical Grammar of French, Spanish, and Italian* (New York: Waverly Press, Inc., 1949), pp. 154, 155.

[3]Margaret M. Bryant, *A Functional English Grammar* (Boston: D. C. Heath and Co., 1945), pp. 76,77.

[4]Homer C. House and Susan E. Harman, *Descriptive English Grammar*, 2nd ed. (New York: Prentice-Hall, Inc., 1955), pp. 125, 126.

It would seem expedient to mention at this point that it is not the purpose of this study to insist that the tenses omitted from the traditional verb scheme bear the precise tags of *Conditional* and *Conditional Perfect*. They may well be called *Potential* and *Potential Perfect, Past-Future* and *Past-Future Perfect, Second Future* and *Second Future-Perfect*, or any other suitable name. What is important is to recognize their existence and to include them in the simple verb sequences of our English descriptive grammars. House and Harmon cite the following as examples of the *Past-Future* tense:

(1) I did say that I should return by August 1.
(2) He said that he would retire next month.
(3) She was afraid that he would fail to pass the oral examination.
(4) I said that I should enjoy living in Paris.[5]

In regard to the *Past-Future Perfect* tense, House and Harmon say:

> Should and would as past tense forms of shall and will in the past-future perfect denote that an action is future to some past time specified or implied for the termination of the action. In this use, should and would are pure future auxiliaries (i.e., form-words), not notional verbs, as they are when they denote obligation, compulsion, volition, or desire.[6]

The following are examples of the *Past-Future Perfect* tense offered by House and Harmon:

(1) They would have asked me if they had wanted my advice.
(2) He said that he would not have been surprised at anything you said.
(3) I should have gone to that party if the invitation had arrived earlier.
(4) I believe you would have enjoyed the program.[7]

There may be other grammarians who agree with House and Harmon (far too few). It is hoped that they, along with others, will re-examine this controversial segment given so little concern in the modern descriptive grammars.

Perhaps *Will, Would, Shall*, and *Should* are a bit different from other auxiliary verbs in that they serve numerous functions: Would that he had my valor. (subjunctive) I will you all of my possessions. (synonym for bequeath) You should tell the truth. (modal auxiliary of obligation) We would take frequent walks. (past action that is repeated) They said that they would go. (indirect discourse) There are, of course, other functions; however, they also function as effectively as *Have* and *Do* as auxiliary verbs to form the *Future* (They will write.), *Future Perfect* (They will have

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[5] *Ibid.*
[6] *Ibid.*, p. 128.
[7] Ibid.

written.), *Conditional* (They would write.), and *Conditional Perfect* (They would have written.). To be sure they deserve more than the few references made to them by Hulon Willis, who reluctantly admits that there is a *Future* and a *Future Perfect* tense.[8]

Apparently little has been done toward plugging the existing gap in the sequence of tenses because few native Americans peruse grammar books, and the bulk of grammarians are content to leave things as they are. This article would probably never have been written had a student of foreign languages not been shocked by the fact that in a modern reputable descriptive grammar text there was no mention of the *Conditional* and *Conditional Perfect* tenses (which he had been accustomed to finding in grammar texts for students of French, Spanish, and German). Very little, if anything, can be done about the books already published, but it is hoped that this article will be instrumental in focusing the attention of the grammarians (who publish in the future) on the fact that just as surely as the *Present* tense has a corresponding *Past* tense, the *Future* and *Future Perfect* tenses do also.

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[8]Hulon Willis, *Modern Descriptive English Grammar* (San Francisco: Chandler Publishing Co., 1972), p. 168.

The Multicultural Approach to Designing an Effective Program of Professional Laboratory Experiences for Prospective Secondary School Teachers*

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"Professional laboratory experiences are all those contacts with children, youth and adults in school and community . . . that make a direct contribution to the understanding of basic concepts and principles as well as individuals and their guidance in the teaching-learning process."[1]

Professional laboratory experiences are essentially learning activities in which the prospective teacher is able to observe teachers and pupils at work; perceive teaching acts or events with understanding; and he is able to become directly involved in carrying out the process of teaching.

Professional laboratory experiences also refer to all deliberately planned educational experiences for prospective teachers that are designed to provide a wide range of opportunities for direct contacts with children, youth and adults in school and community activities. These direct contacts should enable the prospective teachers to:

1. become directly involved with processes of teaching;
2. relate theory to practice.

Professional laboratory experiences are playing an increasingly important role in the pre-service education of teachers. The major concerns of a program employing the experiences are to increase the prospective teacher's knowledge about the science and art of teaching and to

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[1]Flowers, John G., et al. *School and Community Laboratory Experiences in Teacher Education.* Oneonta, New York: American Association of Teachers Colleges (1948), p. 7.

develop his ability in the practice of teaching. Hence, the central purpose of professional laboratory experiences is a clinical study of teaching. Through this planned and continuously active program of highly individualized, meaningful, practical and professional experiences, the prospective teacher will gradually assume responsibility for teaching.

The major aim of professional laboratory experiences is, as the name implies, to involve prospective teachers in a series of curricular activities in which they will have opportunities to perform as many tasks of teaching as possible—tasks that they will be expected to perform when they are employed in a full-time teaching position. For the performance of these tasks to be of maximum value to the beginning teacher, they should be performed under the capable direction and supervision of a master teacher in an on- or off-campus laboratory setting with proper and adequate physical, cultural and human resources. These realistic professional experiences provide relevance and challenge in teacher education, as they bring about the fusion of educational theory and practice.

Professional laboratory experiences are designed to integrate educational theory and practice into a closer functional relationship, and to promote the development of professional skill through systematic and continuous practice under the direction of qualified public school and college personnel. Therefore, it is within a program of professional laboratory experiences that theoretical understandings and techniques for teaching and learning are developed.

Professional laboratory experiences represent the core of a program for the preparation of teachers. These experiences are designed to demonstrate educational theory in practice and aid the prospective teacher to develop practical skill from the theory learned. A program of professional laboratory experiences represents a directed learning experience during which the prospective teacher becomes increasingly responsible for guiding and directing a group of learners. Pertinent laboratory experiences in professional education are absolutely necessary. The prospective teacher must have realistic and functional experience with observing and carrying out the processes of teaching.

Among American educators today, there is a growing consciousness that revolutionary action needs to be taken to make teacher education experiences meaningful for prospective American teachers. An attempt is made here to discuss one of the fundamental aspects of a teacher education program which needs reexamining and restructuring in order to make the pre-service education of teachers more realistic and meaningful. A program of professional laboratory experiences represents that fundamental aspect of a teacher education program which I shall focus upon in this presentation. I am proposing a restructuring of the pre-service professional laboratory program so as to make professional laboratory experiences meaningful for prospective teachers who will be teaching students whose racial, social, religious and cultural backgrounds differ from those of so-called mainstream students. We need teachers who are

able to cope with multicultural student populations and who have the skills, knowledges and attitudes needed for interacting with multicultural classes. In other words, I am proposing the utilization of the multicultural approach to designing an effective program of professional laboratory experiences. The emphasis is upon the importance of a professional laboratory program which is inherently multicultural. Inasmuch as the public school setting is an immense living laboratory for interaction among diverse peoples, it ought to be possible to design a pre-service teacher education program that mirrors this plurality—in a way that will sensitize present and future teachers to the needs and the opportunities created by cultural pluralism in the classroom.

The new emphasis throughout the world on developing understanding among people of diverse cultures has resulted in the need for educational institutions of higher learning to reexamine their curriculum and course offerings to meet this challenge. It is apparent that our greatest domestic failure is our inability to assimilate the non-white minorities into the mainstream of our society. Thus, the University, particularly the teacher education program, has a social, moral and academic responsibility to train teachers for diverse ethnic groups (Blacks, Mexicans, Puerto Ricans, Cubans, American Indians). Prospective teachers must become aware of the fact that the American society is characterized by cultural pluralism and ethnicity; and that an emerging role of the school is to fulfill the growing demand for equality of opportunity and acceptance of all cultural groups. Schools have not only been strongly urged to facilitate equality, desegregation and participation, but have been required to serve as instruments for their realization. Yet polarization of diverse cultural groups within communities has intensified and our schools, in many instances, have become centers of confrontation. This volatile state of affairs under-covers the need for a restructuring of the core of a teacher program—professional laboratory experiences—so as to equip prospective teachers with the proper knowledges and attitudes pertaining to:

1. the cultural heritage of non-white minorities;
2. the lifestyle of minorities and the relationship of that lifestyle to learning and adjusting into the large society;
3. human relation skills which are needed to cope with animosity that often exists among majority and minority groups;
4. compensatory education for the culturally deprived.

It is the responsibility of the school to help the prospective teacher to develop an understanding and respect for the culture of other diverse groups. A planned program of multicultural professional laboratory experiences will enable the school to fulfill such a complex and demanding responsibility.

A functional multicultural professional laboratory program provides an ideal opportunity for directing prospective teachers toward the development of self-analysis and self-improvement as teachers and as students,

thereby promoting discovery of their strengths as teachers and revealing how to capitalize upon them in the process of learning how to function and adjust in a culturally diverse society. Needed interpersonal skills, which may have been neglected in early professional training, are often developed. These skills will enable the prospective teacher to improve teacher-pupil relationships, teacher-teacher relationships, teacher-administration relationships, and finally, teacher-community relationships in the multi-ethnic schools and pluralistic society of today.

Multicultural professional laboratory experiences will help prospective teachers to acquire those knowledges, teaching skills and attitudes which will help them to teach effectively in a society of many different cultures; acquaint prospective teachers with the great diversity of lifestyles which our multicultural heritage embraces; and they will help the prospective teachers to develop those competencies needed by teachers who teach in a Multicultural Education Program. Wynn[2] sees the following identified competencies needed for effectively teaching specified culturally different youth.

1. Demonstrating effective techniques and methods to build and enhance the self-concept of learners.
2. Conceptualizing the dimensions in which the learner may be expected to grow and learn under diverse home and community environmental conditions.
3. Recognizing the importance of overcoming cultural and racial stereotypes.
4. Understanding the interdependence needed among the various cultures for the enrichment of learning how to live, grow and learn in a pluralistic society.
5. Understanding the history of minority groups in the United States and, in particular, of the civil rights movement.
6. Demonstrating knowledge about the psychology and impact of prejudice.
7. Planning viable and relevant means for combating prejudice and negative reactions as reflected in parent and student behavior.
8. Understanding that all people are human—with individual feelings, aspirations and attitudes no matter what cultural orientation they represent.
9. Recognizing the importance of being prepared to encounter prejudice and hostility as reflected in parental and community reactions.
10. Assuming responsibility for examing own motives—and what disciplines they apply to.

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[2]Hunter, William A. *Multicultural Education Through Competency-Based Teacher Education.* Washington, D. C.: American Association of Colleges for Teacher Education (1974), pp. 103–105.

11. Supporting self-initiated motives of all people and not condemning or prejudging their motives.
12. Assisting all young people to understand and confront feelings of ethnic groups other than their own.
13. Staying with and working through difficult confrontations.
14. Showing interest in understanding the point of view of all cultural representation.
15. Demonstrating directness and openness in expressing feelings.
16. Identifying and exploring solutions to problems arising in cultural diversity.
17. Recognizing and creating positive ways to cope with racial attitudes of young people as shown in their behavior.
18. Creating a climate of mutual trust and constructive interpersonal and intergroup relationships.
19. Building intercultural cohesiveness and dispelling myths about the intellectual inferiority or superiority of ethnic groups.
20. Demonstrating research skills relating to cultural pluralism.
21. Recognizing the importance of stressing the insights of sociology, psychology, cultural anthropology, and other relevant fields in facilitating learning outcomes in a pluralistic setting.
22. Demonstrating methods and techniques to offer young people options which allow for alternative styles of learning.
23. Recognizing that within the realm of potential of every human being there is a level of awareness and achievement which can make life rewarding, and that most young people want desperately to find that level.
24. Assuming the responsibility of helping to devise programs which reach out to students and engage them in a process which is both interesting and fair and will, thus, lead to a level of awareness and achievement which gives them a positive perception of themselves and their relationship to others.
25. Developing viable strategies to confront young people with moral, ethnical and spiritual conflicts of their culture and motivate them to devise a system of values which is both personal and internalized.
26. Demonstrating that the color of an individual is not nearly as important as his or her competence.
27. Developing objectives and activities to enhance the self-confidence young Black learners use in guarding against the trappings of condescension.
28. Planning to include learners in full participation in the decision-making process relative to instructional activities.
29. Selecting materials that will not derogate or ignore the identified culturally different group.
30. Building and promoting viable channels for meaningful com-

munication among students, colleagues and parents to lessen language barriers.

31. Recognizing the value of various evaluative instruments and their uses with multicultural education.

Basic assumptions underlying a multicultural approach to designing a program of professional laboratory experiences are:

1. The ultimate aims of education are to:
   a. develop the unique potentialities of the person;
   b. transmit, perpetuate and improve the cultural heritage;
   c. assist all persons in acquiring those skills, knowledges and attitudes needed for effective participation and adjustment in the American society.
2. America is a culturally diverse society.
3. Cultural pluralism is a basic reality in the American classroom.
4. The educative process should be designed, at all levels, to promote the cultural enrichment of all children, youth and adults through programs rooted to the preservation and extension of cultural diversity as a fact of life in American society.
5. Multicultural education in the elementary and secondary schools is essential if students are to be assisted in developing skills, attitudes, values and operational concepts which will enable them to function effectively in a society of diverse cultural groups.
6. Multicultural teacher education programs are needed in order to involve prospective teachers in curricular experiences which will help them to function effectively with pupils in a culturally diverse society.
7. A program of multicultural professional laboratory experiences should be an integral part of the multicultural teacher education programs. A program of direct professional experiences, in which prospective teachers will have many meaningful and functional contacts with students and teachers in a culturally pluralistic laboratory setting accurately representing the diverse society of America, is basic to producing competent teachers.
8. Multicultural professional laboratory experiences should focus upon curricular experiences which:
   a. reflect the culturally diverse nature of American society;
   b. promote cultural pluralism;
   c. support the qualitative expansion of existing ethnic cultures;
   d. encourage the incorporation of all subcultures into the mainstream of American culture;
   e. promote alternative and emerging lifestyles;
   f. provide leadership for the development of individual commitment to a social system where individual worth and dignity are fundamental tenets.

Characteristics of multicultural professional laboratory experiences are:

1. Prospective teacher is able to demonstrate his ability to promote desirable learning or exhibit behaviors known to promote it in clinical settings with multicultural populations.
2. Prospective teacher is held accountable for attaining a given level of competency in performing the essential tasks of teaching required in a variety of multicultural settings.
3. Instruction is individualized and personalized.
4. The learning experience of the prospective teacher is guided by feedback.
5. The prospective teacher is permitted to progress at his own rate, with many alternatives and options in multicultural settings.
6. The prospective teacher is involved in a field-centered program of multicultural professional laboratory experiences.
7. The prospective teacher is involved in a broad-based decision-making process.
8. The materials and experiences provided to the prospective teacher focus upon multicultural skills, concepts and knowledges which can be learned in a specific instructional setting.
9. Protocol materials focusing upon cultural pluralism are used to help the prospective teacher recognize and understand concepts in multicultural teaching and learning.
10. Training materials focusing upon humanism in education are utilized to enable the prospective teacher to reproduce or put into action a sequence of activities or procedures implied by multicultural educational concepts.
11. Multicultural professional laboratory program is a performance-based approach to preparing teachers for the real world.
12. Particular attention is given to the unique needs of students from different cultural and linguistic backgrounds.
13. Faculty, as a whole, reflects rich and varied backgrounds appropriate to the activities offered.
14. The competence of the faculty is reflected in their instruction through the demonstration of positive attitudes toward the cultural diversity which characterizes American society.
15. Emphasis is upon programs to prepare teachers to work with children belonging to specific cultural groups.
16. Availability of resources and facilities necessary to prepare prospective teachers who will be responsive to the particular needs of multicultural students.

Action pointers for designing a multicultural professional laboratory program are:

1. Multicultural professional laboratory experiences should be an integral part of a teacher education program: general, professional and special.
2. Multicultural professional laboratory experiences should occur continuously throughout the entire teacher education.

3. Multicultural professional laboratory experiences should be directly related to the goals and educational theory of a teacher education curriculum.
4. Multicultural professional laboratory experiences should be planned in a graduated, logical and sequential manner, according to the sequence of educational content within the teacher education curriculum.
5. The nature of the multicultural professional laboratory experiences should be determined by the specific needs and interests of the representatives of the diverse cultures and ethnic backgrounds, and the cooperating laboratory student personnel; the specific professional goals sought, and the equipment and resources of the college and laboratory situation.
6. The length of multicultural laboratory experiences should be determined by the specific needs of the students and the unique characteristics of the laboratory situation.
7. Multicultural laboratory experiences should be cooperatively planned by all participants: college personnel, students, and cooperating laboratory personnel.
8. Multicultural professional laboratory experiences should include a wide range and variety of direct contacts with all kinds of learners in different situations.
9. Multicultural professional laboratory experiences should be supervised by both the college personnel and cooperating personnel; they should be carefully supervised with appropriate guidance and assistance.
10. Multicultural professional laboratory experiences should provide for intellectualization, whereby prospective teachers will be involved in laboratory situations that will help them to act consistently with the principles of learning and teaching that they have been taught; and will help them to generalize from experience.
11. Multicultural laboratory experiences should provide for the evaluation of the student's growth by all personnel in the program.
12. A multicultural professional laboratory program should be organized and administered according to democratic educational principles, which would give rise to a program with the following attributes:
    a. Experimentation
    b. Equality of opportunity
    c. Participation by all persons involved in the program
    d. Faith in prospective teachers and cooperating personnel
    e. Respect for personality and human worth
    f. Skills of cooperation
    g. Opportunities for prospective teachers to acquire the skills,

attitudes and information which will aid in the development of self-control and the free individual.

h. Recognition of the special values and needs of various cultural groups

i. Opportunities for prospective students to gain understanding and appreciation of the culturally diverse nature of American society.

Concepts and strategies for implementing a multicultural professional laboratory program:

1. Cross-cultural experiences are needed for pre-service teacher education students.
2. Prospective teachers of all races and socio-economic backgrounds can learn to work with children from cultures different from their own. Training programs must give highest priority to this endeavor.
3. Humor is preferred as a vehicle for communication during the early stages of a teacher's multicultural training.
4. Multicultural laboratory experiences must help the prospective teacher understand that the teaching process is always a cross-cultural encounter.
5. Multicultural laboratory experiences must help the prospective teacher understand the many cultures within the United States of America. Teachers must intimately understand the cultures of their students.
6. Multicultural professional laboratory experiences should help the prospective teacher function effectively with pupils in a culturally diverse society.
7. Professional laboratory programs should recruit groups of prospective teachers with broad cultural perspectives. Cross-cultural peer feedback is needed. Group discussions are quite helpful when participants are from different backgrounds.
8. The clinical settings for the professional laboratory program should contain a multicultural population which represents all socio-economic levels within as many diverse cultural groups as possible.
9. The Professional Laboratory Program should contain a multicultural professional staff in public schools and training institutions. A true multicultural perspective begins with multiculturalism among those who are responsible for planning, executing and evaluating programs.
10. The multicultural perspective is required in all phases of program development. Judgments regarding site selection, master selection, student-teacher performance with pupils, professional library resources, require a variety of cultural viewpoints.
11. The professional laboratory program should have professional personnel who have demonstrated their own ability in fostering

growth in pupils from different cultures from their own. Hope for a new teacher comes from those who have had real and successful cross-cultural experiences in facilitation of learning.

12. Professional laboratory programs should draw upon the successful cross-cultural teaching experiences of some teachers of all races and socio-economic backgrounds.
13. The professional laboratory program must provide for a wide variety of cross-cultural experiences in diverse communities which are made up of various ethnic groups.
14. The professional laboratory program should provide each prospective teacher with multicultural contact over time. Guided cross-cultural experiences should extend throughout the four years of college. Some courses in general education and the area of specialization may be used to serve as vehicles for cross-cultural experiences.
15. The prospective teacher must have successful experiences with multicultural children. They must see that they can teach children from other cultures successfully. All training programs for teachers should provide a variety of experiences wherein the student teacher may demonstrate his ability to teach successfully in a multicultural context.
16. Teachers-in-training must be able to observe in classrooms where they can see minority children being taught successfully. Student teachers must be placed in schools where teachers are equal to the task of teaching minority children.
17. Multicultural professional laboratory experiences should help the prospective teacher understand that the habits, values, mores, folkways, customs, attitudes, philosophy, aspirations, likes, dislikes, ideals, self-concepts and motivations of a teacher are critical inputs in a teaching-learning process. These and other aspects of a teacher's total personality bear heavily upon the nature of the classroom interaction and produce positive or negative effects upon pupil growth.
18. Multicultural professional laboratory programs should help the prospective teacher to examine his own behavior in a multicultural setting rather than merely dealing with multicultural ideas in the abstract. Professional laboratory experiences must provide curricular experiences in which the prospective teacher's own behavior in cross-cultural settings is the subject of examination and experimentation. If teachers are to work successfully with students from cultures different from their own, training programs must provide for more than intellectualization about cross-cultural issues.
19. Multicultural professional laboratory experiences should help the prospective teacher to understand that the public school

classroom is a potent matrix, and that his involvement in its activities are crucial to the behavior of students.

20. Multicultural professional laboratory experiences should help the prospective teacher to understand and recognize when students respond as victims of oppressive conditions, as opposed to responses to perceived pathology.
21. Multicultural professional laboratory experiences should help the prospective teacher understand that all minds are equally complex. Experience with students from different cultures is essential for developing a real respect for, and understanding of the real potential of all students.
22. Instructional materials, equipment, facilities and teaching tools such as textbooks, courses of study, tests, films and curriculum guides should be modified to focus upon and reflect the characteristics, needs, problems and developmental tasks of multicultural children.
23. It is true that instructional resources and teaching tools are culture bound and tend to focus upon the mainstream of American culture.
24. Cultural differences are ignored, thereby causing the poor, racial and ethnic minorities to feel isolated and mistreated.
25. The prospective teacher should be involved in clinical experiences which will help him develop a predisposition toward doubt and caution in the utilization of professional tools; and aid him in acquiring the motivations, drive, skills and knowledges needed for modifying or creating instructional equipment resources, and professional tools which can be adapted to quality multicultural teaching and learning.
26. Multicultural professional laboratory experiences should use the community as a laboratory.
27. Multicultural professional laboratory experiences should provide opportunities for the prospective teacher to apply rational thinking to real-life problems of living in a culturally diverse society.
28. Multicultural professional laboratory experiences should equip the prospective teachers with those skills that are conducive to building and enhancing the self-concept of multicultural children.
29. Human relations training should be incorporated into multicultural professional laboratory experiences.
30. Multicultural professional laboratory experiences should provide for involvement guidance and intellectualization.
31. Multicultural professional laboratory experiences should utilize instructional resources that will adequately reflect multicultural education.

32. A rich field for multicultural professional laboratory experiences is provided by regular campus activities.
33. Multicultural professional laboratory programs should include continual and varied field experiences which will focus upon increased multicultural awareness; and increased intercultural experiences.
34. Multicultural professional laboratory experiences should be challenging and satisfying.

Effective teaching is the goal of teacher education. A program of multicultural professional laboratory experiences is the major avenue through which prospective teachers may acquire these knowledges, skills and attitudes which increase teaching effectiveness in today's pluralistic society. In this program they interact with and observe multi-ethnic groups of teachers and students function in the educative process of a culturally diverse society; observe and put educational theory into practice; develop instructional skill and a functional understanding of principles of education upon which practice should be based; and they acquire the fundamental skills needed for effective interaction, communication and personal and social adjustment in a humanistic society of many unique cultural groups.

The implementation of a functional multicultural professional laboratory program is the most challenging and demanding obligation in teacher education. The imperative in teacher education is to help the prospective teacher to acquire the skills, competencies, and understandings they need to function as effective teachers of multicultural children.

Anomy Revisited

by
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Introduction

The purpose of this paper is to examine a set of assertions made by McClosky and Schaar (1965) concerning characteristics related to the phenomenon, anomy. In their work McClosky and Schaar revised Durkheim's traditional model which defines anomy essentially as feelings of normlessness arising from social conditions and resulting in certain behaviors. In their assessment of the causes of anomy they give considerable weight to psychological (rather than sociological) variables. In their study the authors maintained that feelings of anomy result when socialization (norm learning) is blocked. Such blockage, McClosky and Schaar maintain, can be due to psychological phenomena including emotional and cognitive factors as well as the beliefs of the individual.

From their research (1965) McClosky and Schaar drew the following conclusions: (1) deficient cognitive capacity is related to high scores on anomy; (2) persons predisposed to maladjustive emotional states tend toward strong anomic feelings; (3) persons who hold rejective attitudes toward people are likely to score high on anomy.

The results of an assessment of several types of social-psychological attitudes of persons in four strata provided an opportunity to re-test these three previously listed conclusions from the McClosky and Schaar research.

Methodology

The Sample

Data were collected by a stratified random sampling technique from four groups: (1) persons residing in Leon county, Florida (general

population); (2) service-oriented professionals; (3) psychiatric patients; and (4) prisoners.

The first group, general population, was designed to be representative of persons residing in this county. One hundred seventy-five names were selected at random from the city directory. Data were collected through a mailed questionnaire. A low response rate was anticipated; the total response rate for this sample was 45% (N=73) when eliminating nondeliverable questionnaires. In examining the data it appeared that respondents from this group had a higher level of education than is typical of the population from which the sample was taken.

The second sample in the same geographic location was taken from the following subgroups of service-oriented professionals: teachers, ministers, nurses, school counselors, psychologists, and social workers. The names of subjects were randomly selected from their respective professional associations' listings of local membership. One hundred names were selected from a total pool of 500—half of whom were public school teachers. This group received questionnaires by mail as did the group representing the general population. Response rate for this group was 55% (N=52).

A third group involved in this research were 65 inmates who were randomly selected from 220 inmates at Union Corrections Institution at Raiford, Florida, who had achieved a ninth grade reading level (as indicated on a general achievement test given prior to their admission at UCI). The total population of this institution was 1,846. Data were collected by a group administration of the questionnaire inside the prison. Two points were stressed to these inmates: (1) Do not write your name on the questionnaire; (2) Since you can't be identified, your responses can not help or harm you. The response rate for this group exceeded 90%.

A fourth group included in this study were psychiatric patients from the Florida State Hospital. Questionnaires were completed by fifty-four persons in the FSH educational program who volunteered to participate in this study and who had mastered the reading level required to complete the questionnaire.

The Instrument

The questionnaire used in this study included several attitude scales aside from the anomy scale of McClosky and Schaar: a self esteem scale (Rosenberg, 1965); a faith in people scale (Rosenberg, 1957); and a social responsibility scale (Berkowitz and Lutterman, 1968).

The following nine items comprise the McClosky and Schaar Anomy Scale. Responses are forced choice, agree-disagree.

> With everything so uncertain these days, it almost seems as though anything could happen.
>
> What is lacking in the world today is the old kind of friendship that lasted for a lifetime.

With everything in such a state of disorder, it's hard for a person to know where he stands from one day to the next.

Everything changes so quickly these days that I often have trouble deciding which are the right rules to follow.

I often feel that many things our parents stood for are just going to ruin before our very eyes.

The trouble with the world today is that most people really don't believe in anything.

I often feel awkward and out of place.

People were better off in the old days when everyone knew just how he was expected to act.

It seems to me that other people find it easier to decide what is right than I do.

Findings

As a method of re-examining the McClosky and Schaar assertion that deficient cognitive capacity is related to high scores on anomy, anomy scores were examined by education (a variable also used by McClosky and Schaar to operationally define cognitive capacity). When all groups were combined a general trend is apparent; as level of education increased, anomy declined. This finding supports the results of the McClosky and Schaar research.

McClosky and Schaar also found that persons with maladjustive emotional states tend toward strong anomic feeling. In their research, however, 'maladjustive emotional states' were operationally defined as scores on other attitude scales measuring inflexibility, anxiety, aggression, and poor ego strength. In this research psychiatric patients were used to meet the criteria of persons with maladjustive emotional states. As Table 2 shows, persons with such characteristics did not score significantly different from the general population on anomy. In this study the data failed to support this critical assertion of McClosky and Schaar, when a different, but conceptually related operational definition was applied.

The analysis of variance test was also used to check for significant differences in anomy scores by group (sample), sex, race, education, and age. However, anomy scores differed significantly (alpha $\leq$ .05) only on the variable, education.

In their previous study McClosky and Schaar stated that persons who hold rejective attitudes toward others are likely to score high on anomy. The authors indicate that anomy may be an outgrowth of "a negativistic, despairing outlook both on one's own life and on the community in which one lives," (Robinson and Shaver, 1969, p. 169). Also, the authors indicated strong positive associations (r=.50 or better) with

TABLE 1

MEAN SCORES ON ANOMY BY EDUCATION ACROSS ALL GROUPS: GENERAL POPULATION, SERVICE-ORIENTED PROFESSIONALS, PSYCHIATRIC PATIENTS, AND PRISONERS

Grades Completed		N	Mean	Standard Deviation
Secondary				
Below	7	8	6.8	1.8
	7	13	6.3	1.8
	8	6	5.7	2.7
	9	12	5.8	2.0
	10	14	5.5	2.3
	11	10	7.0	1.7
	12	38	4.5	2.3
College				
	1	13	4.2	2.6
	2	23	3.8	1.9
	3	7	2.0	.8
	4	29	2.9	1.6
	5	12	2.5	1.6
	6	11	2.4	1.6
	7	3	2.0	1.0
	8	4	3.5	1.7
Beyond	8	1	1.0	

related scales including alienation, pessimism, and bewilderment (Robinson and Shaver, 1969).

As a way of investigating this issue a check was made on the degree of association between anomy scores and Rosenberg's Faith In People Scale (alternately called misanthrope scale). This five-item scale involving forced choice of two responses is designed to measure "one's degree of confidence in the trustworthiness, honesty, goodness, generosity and brotherliness of people in general" (Robinson and Shaver, 1969, p. 526). The data show when all groups are combined that anomy had a moderate negative association with faith in people (r=–.43). Also, anomy had a moderate negative association with faith in people in the general population (r=–.51) and in the service-oriented professional samples (r=–.58). Considering the apparent conceptual relationship between misanthrope and anomy, it seems that the moderate association between these two atti-

TABLE 2

ANALYSIS OF VARIANCE WITH NO INTERACTIONS ON McCLOSKY AND SCHAAR'S ANOMY SCALE

Source	Degrees of Freedom	Sums of Squares	Mean Square	F Ratio	Power Estimates
Group	3	4.29	1.43	.36	.76
Occupation	6	23.41	3.90	.99	.63
Sex	1	2.23	2.23	.57	.89
Race	1	12.32	12.32	3.13	.89
Education	2	44.60	22.30	5.66*	.82
Age	4	11.73	2.93	.74	.71
Error	144	567.46	3.94		
TOTAL	161	932.87			

*alpha = .05

tudes lends support to McClosky and Schaar's view that high anomy persons are likely to hold rejective attitudes toward others.

Additionally, the data from this research supplement the McClosky and Schaar research since, when all groups were combined, anomy and self esteem had a moderate negative association (r=–.44). Berkowitz and Lutterman's Social Responsibility Scale designed to assess a person's orientation toward helping others also has a modest negative association with the McClosky and Schaar scale when all groups are combined (r=–.44). Both of these findings support the hypothesis that specific anomic feelings may have psychological as well as sociological precursors.

Summary

One aspect of this research involved testing the McClosky and Schaar assertion that deficient cognitive functioning (as defined by level of education) is positively associated with anomy by a replication with a different sample. Using a sample composed of four strata, the data supported the original research on this issue. Support was found for the assertion that persons holding rejective attitudes toward others would be high in anomic feeling. Anomy scores correlated negatively with Rosenberg's Faith in People Scale, Rosenberg's Self Esteem Scale, and Berkowitz and Lutter-

TABLE 3

PEARSON PRODUCT MOMENT CORRELATIONS FOR ALL FOUR GROUPS BETWEEN THE SULLIMAN SCALE OF SOCIAL INTEREST, ROSENBERG'S SELF ESTEEM SCALE, BERKOWITZ AND LUTTERMAN'S SOCIAL RESPONSIBILITY SCALE, McCLOSKY AND SCHAAR'S ANOMY SCALE, AND ROSENBERG'S FAITH IN PEOPLE SCALE

	Social Interest	Self Esteem	Social Respon-sibility	Anomy	Faith in People
Social Interest	1.00	.43	.58	–.46	.30
Self Esteem	.43	1.00	.48	–.44	.11
Social Responsibility	.58	.48	1.00	–.42	.19
Anomy	–.46	–.44	–.42	1.00	.43
Faith in People	.30	.11	.19	–.43	1.00

man's Social Responsibility Scale. Each of these findings support the original hypothesis of McClosky and Schaar that psychological variables in addition to social conditions can contribute to anomy.

However, this research failed to support the assertion that maladjustive emotional states would constitute a psychological variable strongly related to anomy. In this study psychiatric patients from the state hospital did not score higher on anomy than members of the general population. Consequently, support for the conclusions drawn by McClosky and Schaar (1965) is mixed.

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