Percy C. Buck

PSYCHOLOGY *for* MUSICIANS

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by

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PREFACE

THIS book is not, and does not pretend to be, a treatise on Psychology. It is an attempt to help musicians—more especially the music-teachers amongst them, present and future—to realize that Psychologists have many suggestions to offer them, both interesting and important, which can be applied to the Art of Music in all its branches.

Such an attempt, ideally, should obviously be made by one who is both a trained psychologist and a trained musician. But since such an Admirable Crichton does not seem to exist—or in any case has not so far ventured on the task—I hope it will not seem over presumptuous for an amateur psychologist to try to show his fellow-musicians some of the ways in which his own mind has been swept and garnished by the effort to grasp, however falteringly, the facts and underlying principles of Psychology.

It may reasonably be asked why such an attempt should be made at all, since it would seem from the start bound to be somewhat superficial, and conceivably might result in a mere smattering of knowledge and technical terms, which in itself might be a danger and a hindrance to true understanding. The answer is this. Schools which, by accepting the provisions of the 1918 (Fisher) Act—of which the Burnham scale of pay for teachers is probably the most familiar feature—become entitled to be called "approved" schools, must engage teachers who have been through a Teachers' Training Course. And it was ordained that in such a course one of the compulsory subjects must be Psychology. Consequently all of the principal music-schools of the country, which at once instituted Training Courses, were obliged to find a lecturer in this subject. At the Royal College of Music it has been my privilege to give the Psychology lectures from the beginning, and this book, as many old pupils will recognize, is a compendium of the various talks to which they have had to listen.

One personal explanation I should like to make. Originally the book was written in 1939, being finished at Christmas, when the war had lasted some three or four months. As the possibility of publication seemed remote, it was put on one side to await happier times. Owing to the attentions of the *Luftwaffe* it was completely destroyed, together with all my notes, papers, music, and library. That version was altogether more formal and sedate than this one; carefully documented, and full of references and verified quotations. I have had to rewrite it entirely "out of my head", from my memory of the things I have been talking about for so many years; for I have found it impossible,

even in libraries, to get at the many volumes I wished to consult. And it seemed best, under such circumstances, to use the kind of language which comes most naturally to me, rather than to aim at a more literary style.

These facts will, I hope, mitigate any feelings on the part of real psychologists that I have treated their subject with less erudition and dignity than it deserves.

My very real gratitude is due to Professor Cyril Burt, who was good enough to read my manuscript and to make numerous suggestions. I have taken advantage of so many of these, that, if there is any value in the book, much of it must be credited to him. But if the trained psychologist finds, here and there, cause to raise his eyebrows, I beg him to attribute the lapse entirely to me, since in a few cases—an instance is the avoidance of such a word as "Kinaesthetic", which would have simplified many purely psychological points—I have been stubborn enough to adhere to my belief that of all the dangerous forms of knowledge that of "blessèd words" is the most insidious.

P. C. B.

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CONTENTS

CHAPTER ONE

PROLEGOMENA

THE Sciences, whatever their particular subject matter may be, invariably follow one simple method of development. Each of them begins with the collection of facts, and proceeds to classify such facts until some principle emerges from them which can be treated as a working-hypothesis; and the more often we find that this hypothesis proves to be true, the nearer we are to the discovery of a law.

Psychology developed, as it was bound to do, along these lines, and began by noticing quite ordinary things and striving to piece them together; so that in this state it might be roughly defined as *Organized Commonsense about Human Nature.*

> The critical word in the above definition is "organized". And it is worth while to consider how even the ordinary things in life owe far more to organization than we think. If we had not, as children, been taught our alphabet with the letters invariably in the same order, we should probably never have mastered it at all. If, in learning the multiplication-table, we had learnt isolated facts—on one day that $3 \times 3 = 9$, and next day that $7 \times 8 = 56$—we should never have arranged our bits of information into a system. Any child will soon learn how to look out a word in a dictionary, and later on a train in a timetable, because it comprehends the plan; and the reason that most of us Londoners prefer an A.B.C. to a Bradshaw is that we have mastered the somewhat elementary basis of the one, but have been too lazy to master the system of the other.

Thus we arrive at an important discovery of Psychology—one of momentous value to teachers of any subject—that you can count on your pupils doing far better, if you provide them with some kind of scheme or logical connection in the facts they assimilate. The mind that is willing to set to work without a plan of some sort is not intelligent. Ask a boy to mow the tennis-court; he will, before beginning, decide to run the machine either across or lengthwise in parallel lines. Were he to start from just anywhere and zig-zag haphazardly in any chance direction, you would have very serious doubts as to whether his intelligence was normal.

A little thought will show us how all advances come from the discovery of some underlying principle. For instance, primitive nomad tribes wander about, happen on a tract where there is food growing, eat the place bare, and wander off to find another. Then someone discovers that corn grows from seed; so they eat the best and plant the

remainder, determining to make a return visit. Later, by another brainwave, they discover that by planting the seed from the *best* corn they will improve the future crop they are counting on; and so the quality of food and the standard of living gradually improve.

Music-teachers should learn from this that even the elements of music ought, from the very beginning, to be based on some principle. In the matter of key-signatures, for instance, I have found numberless students, often quite advanced instrumentally, who had no idea that the last sharp in a key-signature is always, in major keys, the leading note. And quite lately I "supervized" a class of children being taught by such a student. As she told me that she was teaching signatures I asked a child what major key had four sharps: "We've only learnt one sharp G, two sharps D, one flat F, two flats B♭, so we don't know." Surely if there are seven different major keys with sharps it must be easier to teach one rule than to memorize seven isolated facts?

The time arrived when Psychology became too big and broad a subject to be treated as mere organized common-sense. The experimental and quantitative methods used in other sciences were then introduced into Psychology, so that it became a laboratory science, like physiology or chemistry. The reason for the change, both in nomenclature and method is due to the discovery by psychologists—possibly owing to the teaching of Locke—that, when you teach a pupil, the thing you are really teaching, and must make contact with, is the pupil's *mind*. Accepting this discovery it became imperative to inquire into what Mind is and how it works; and perhaps the simplest definition of Psychology is that which calls it the *Science of the Mind*. Every musician, whether performer, teacher, or composer, has to make his appeal to the minds of his fellow-creatures; so he may reasonably expect to make that appeal more effective if he has studied the apparatus with which he has to make contact.

Let us first try to determine what the mind is, and its field of action. Suppose your car is at your front door, and you are going to drive somewhere in it. You take your seat, turn on the petrol, start the engine, and go through all the necessary drill. At the right moment the engine connects with the car and you are moving. You can go on, stop, turn right or left at your pleasure.

Now I want you to notice just one fact: that the car is a machine, whilst you are a mind. The car did everything solely because your mind made it act in that way. No sane human being has ever imagined, nor ever will, that there can, in some distant future, arrive a day when a

triumphant mechanician will invent a car which can start itself, run down the street, and turn right or left of its own accord. The directing mind must always be there, separate and disparate from the mechanism.

In a human being, however, the miracle has happened. If we imagine, without any gruesome details, a body that has not yet come to life lying on a couch. It is just a machine, like the car, waiting to be put into action. You started the engine of your car, and it at once became alive and full of potentialities; and if you could start the heart-beating of the body on the couch it too would then be alive. But at some later moment the body, unlike the car, will take direction of its own movements, will lift an arm, or will perform some act of its own accord. It has become "aware", it is conscious, it has performed the miracle of fusing the machine and the directing mind into one; and a mechanism has become a personality.

We may call this directing mind the *Ego*, and the machine—which, being directed, is naturally in the accusative case—the *Me*. In this sense the motor-car consists of nothing but Me; it has no Ego, and never will have one, so the missing element has to be supplied in the form of a driver, separate and apart. The human being is Ego and Me fused into one by *Consciousness*.

Any student specializing in Psychology would be expected at this point to read widely and to think deeply in order to be clear-headed on the meaning and implications of this word. And such reading and thinking—even if not very wide or deep—would be good for, and I believe interesting to, all of you. You would find, for instance, that when we are stunned our consciousness ceases; but that when we go to sleep it seems to be quietly in abeyance, still acting, though out of our control. It is a common experience for one to go to sleep worrying over some problem, and to wake up to find the problem has, as we say, "solved itself"; our mind has been working, as it were, "on its own".

The phrase *Subconscious Mind* has been invented to account for such workings as the above; and it is worth calling your attention to such a phenomenon, as you will find very soon that one of the really important facts which Psychology has to teach you and me is that we shall do our job better—especially the physical part of it—if we trust the machine to do it without the supervision of the mind. All of us, at some awkward moment in our lives, have been quite unable to recall the name of the person to whom we are talking. At last we give it up in despair and go about our business; and straightway the name comes to mind—when we are not thinking of it at all.

For non-specialists it is sufficient to know that when the body on the couch became "aware" and self-acting it had been provided with a

Mind; recognizing that to the Psychologist the word mind does not cover processes of a single type. Nearly every mental process includes three distinguishable functions: *Thinking*, *Willing*, and *Feeling*.

Nowadays Psychologists have still further extended the field of their study, and find that the last definition—the Science of the Mind—is a little cramping. So you will find modern Psychology has to allow for an enlarged scope. Earlier psychologists treated the processes of the mind as though they were always conscious processes—often, indeed, as though they were exclusively intellectual processes. It is essential, therefore, to realize that feeling and willing are quite as important as perceiving and thinking, and that many of the mind's motives may be wholly unconscious. Such a range must clearly include many things which, however absorbingly interesting they may be to psychologists or in themselves, can add little or nothing to the equipment of a musician. It *would* be interesting to know why, when you are singing or playing at your best, your dog just sits and howls; but the knowledge might conceivably lead to your trying to perform so as to please him, and so the problem may well be left alone.

There are two purely psychological points which are worth noticing before we go on.

(a) Ask any friend what he means by the word "experience", and you will usually get the answer "Something that happens to one". It will be more scientific, and so more true, if you accept the word as meaning, not the event, but your reaction to an event. If you were to overhear someone discussing your character you might feel pleased, or possibly annoyed: i.e. pleasure or annoyance would be your reaction. If you did not quite catch the remarks, your reaction would be curiosity as to what was really said; if you were deaf and heard nothing, then there would be no reaction. Yet in all three cases the event—i.e. the whole occurrence outside yourself—was identical, though you had in each case a different experience. We all start our lives with an inherited disposition: a tendency to react in a certain way; and every experience we undergo adds itself to our accumulating knowledge of how to meet—i.e. to react to—a situation, how to control and conduct ourselves, and how to piece together our experiences into an understanding of life. And all the time we are modifying our native dispositions.

(b) In our very early days, when we are acquiring new data at every moment of our lives, we acquire knowledge almost entirely through the evidence of our senses; and this fact is epitomized by saying that children are *Objective*. It is certainly true that children (a word which means unsophisticated folk of any age) are struck

by the superficial things. It is the plot and the incidents—especially the accidents—in the story: the brilliant colour or the "anecdote" in the picture: the tune and rhythm of the piece of music, or the brass band playing it: these are the things that arrest and hold the young. And the process of education is very largely a growth and development away from the purely objective stage, and towards the stage when the mind can apprehend the meaning and purpose that lies behind the outward and visible sign. That means, towards the *Subjective*, or *Interpretative*.

In the Arts this is specially true. The ingredients of a popular tune—its rhythm, shape, sequences, etc.—are generally so obvious as to be almost primitive, and the popular picture is the one that tells a story (like "The Doctor") or recalls (like "Derby Day") some event which everyone can take in. It is right and natural that this should be so, and it would be unpsychological to lament it; all that is asked of you is to be indignant that, as far as music is concerned, so many millions should make no progress in discrimination and never discover that music has any meaning at all. For as we grow up and develope in taste we discover that the plot, the colour, and the tune, important though they still are, are infinitely less absorbing to us, because we have also discovered that behind words and notes and colours there can be a meaning and a motive which in our early stages we never divined. In every piece of music we hear, you and I search for this hidden treasure, knowing that it is the one thing that really matters since it is the one thing which will touch our hearts. And, in the prosaic language of Science, that means that we have passed at all events *some* milestones on the road from the Objective to the Subjective.

If, as I hope, you have grasped the broad meaning of those two words, one short warning will possibly save you from being somewhat mystified by their use. At first they seem to be synonymous with concrete and abstract; and we then think of them only in connection with the sense of touch. A table is objective because we know it to be "solid". But you must accustom yourselves to think of the words as applicable also to the other senses. The full-score of the Choral Symphony is objective because you can put it on the scales and weigh it; and what you are weighing would be equally objective if it happened to be any other symphony. But the Choral Symphony itself, apart from any copy of it, is also objective because it is in itself a real and recognizable entity, and would continue to be the Choral Symphony if every copy in the world were lost or destroyed.

The last paragraph dealt with a point which is at bottom a philosophical rather than a psychological question: i.e. the meaning of the

word "real". For musicians it will be sufficient to realize that we develop from children, who judge by the easy recognition of melody and rhythm, into more sophisticated beings who look for the feeling embodied in the form; from the tune to which our itching feet insist on beating time, to the hidden meaning behind the quiet phrase which once may have seemed so pointless and unexciting. And one of the greatest contributions that Psychology makes to Civilization—which means the education of man in the mass—is by pointing out that all education, in any subject, must aim at grasping the inner meaning instead of confining our attention to the outward appearance. The fact that England produced Shakespeare and Milton does not mean that we are a literary nation; the test of that is the number of us who appreciate the works of those poets. So when you hear a discussion—as inevitably you will, sooner or later—as to whether England is a musical nation—remind the participants that the question is not to be settled by the number and quality of the composers we produce, nor by the percentage of people who "like music", but by the kind of music these people like.

CHAPTER TWO

REACTION

IN learning any new subject, of any kind, you will always find that there are certain new words, or old words with new uses, with which you must sooner or later become familiar. You cannot discuss cricket with a man who refuses to learn the meaning of "leg-bye" or "coverpoint", nor football or hockey if he does not understand "off-side". One such a word, in Psychology, is Reaction. The word was purposely used in Chapter one, in its usual primary sense; but it will be wise to go a little deeper into its meaning before leaving it.

When a man of Science wishes to examine anything at all minutely, his first endeavour will be to get his material into some logical order or arrangement. In the case of an "event"—i.e. anything that happens—the order will necessarily be chronological. How did the various episodes occur, in order of time, and by what nomenclature shall we group them?

The psychologist has devised four classes which will help you to analyse, or to describe, any happening in your life.

1. Stimulus
2. Sensation
3. Perception
4. Concept

Technical terms such as these, grouped in a style reminiscent of the duller kind of school book, are admittedly a little forbidding; but this particular quartet does serve as an excellent introduction to Psychology —especially to a musician—because it does exactly describe what happens in all circumstances, from the most trivial to the most complicated.

Consider an example. You sit writing a letter, and a knock on the door is heard. What has happened?

(1) Something (in this case air-vibrations caused by the knock on the door) has set your aural nerve working; it has been stimulated into action, so the air-vibrations are the Stimulus.

(2) Your nervous-system is so constituted that when a nerve is agitated into action it carries its message to your brain, and "registers" there. Your body is, from the purely physical point of view, a receiving-apparatus, or sensitive plate, for recording the effects

made on your external nerve-endings by outside stimuli. Consequently you are said to have received a sense-impression which, conveyed to the brain, is in this case immediately recognized as the sensation of sound. You will readily see that the most obvious information you receive about the outside world takes the form of sensation: one of your five[1] senses must be the channel through which the stimulus reaches the brain. If you were to lose the use of all of them, then nothing in the outside world could get into contact with you. You might still be thinking, but your thought would necessarily be confined to things apprehended in previous sensations. In this instance of the door-knocking, for example, if you happened to be deaf your brain would register no sensation, although the stimulus would be the same, whether you are deaf or not. (So, with all your senses, so far as your mind does not interpret the stimuli, what you perceive may be called a simple Sensation.)

(3) You have now the one concrete fact of sound (registered) in your brain, pinned down like a specimen on a piece of cork; and at this moment the higher levels of your mind come into the arena. The mind's first job is to discover what the specimen is, for there are a thousand different noises that might have set your nerve working. From previous experiences you have no difficulty in deciding, or perceiving, what caused that particular noise, and you are said to have a Percept of it. Had the sound which suddenly arrested your attention been a siren, you would have had a different percept though one of the same nature; for you would recognize that the stimulus had not been the same.

(4) At this point the mind, having satisfied itself as to the origin and nature of the sound, begins to cogitate about it: were you expecting anyone, was it a runaway boy, or possibly the postman? In fact, you begin at once to form conceptions of "what you are going to do about it". There are psychologists who treat these plannings of the mind as Concepts. But it will be safer for you and me to use the word in its more restricted sense of general or abstract idea as opposed to a special example. If you look at a coin you have a Percept of it: if you think of your balance (or overdraft) at the bank you have a Concept. If you only know one Sonata in the world, that constitutes your Percept of a Sonata: but if you have even a nodding acquaintance with twenty sonatas you have in your mind an idea of the Greatest Common Measure of them all, and that is your Concept of a Sonata.

[1]The psychologist recognizes more than five senses: but the popular classification will suffice here.

It is always difficult at first to grasp the exact connotation of a technical term—think how long it took you all to discover exactly what is meant by the word "Binary". And in Psychology, as in Music, there are words in the use of which experts are sometimes at variance. The difficulty often arises from our being overapt to think of things as distributable into watertight compartments, whereas in fact classes of things are liable, like the colours of the rainbow, to overlap and run into one another. Where the overlapping occurs is not of supreme importance to us musicians, but it is always important for teachers to try to fix the point at which different minds diverge. Supposing you were to enter a classroom in any school and unexpectedly play the chord D F B♭. To all present the stimulus is identical; all record the same sensations; their percepts are the same, though varying in clearness of definition—they all, for instance, *hear* three notes, though most of them could not tell you the number. But their concepts will vary enormously. I have tried the experiment, and can tell you some of the answers when the listeners were asked what was passing through their minds:

(a) It's a major chord (fairly often)
(b) It's a first inversion (now and then)
(c) It's a common chord (occasionally)
(d) The top note is B flat (rarely)
(e) It's not in tune (perhaps their ears were sharper than mine)
(f) It's the first chord of "God Save the King" (quite frequently)

The sense-organs, then, are in communication with the sensory areas in the Brain; the Brain receives the sensory impulses; and the brain-areas subserving intellectual functions then, as it were, co-ordinate and examine the data supplied.

But there is another factor; one of special importance to musicians. At what point does the question of *Feeling* arise? Most people have, at some time, seen a performance by a white-robed dancer on to whom the limelight man has thrown a variety of colours. The "event" to use that philosophical term again, proceeded quite independently of the tints imposed on it, and would have been exactly the same if the varied hues had been omitted; but a new interest and appeal arose, superadded to our enjoyment, due entirely to the colour-scheme. So every human experience is accompanied by a "feeling-tone", which is the result of our reaction to the experience; and a simple example will illustrate it.

Suppose you are sitting peacefully in an armchair, and sounds strike your ear. You have experienced the sensation of sound, and

you perceive that it is someone singing in the flat upstairs. If that is always happening you may have learnt how to ignore it; or if you are absorbed in the thing you are doing you may have little difficulty in inhibiting attention to it. In both cases the psychological process is nipped in the bud. But if the singing succeeds in forcing itself on your attention, then innumerable results may ensue. It may be a favourite song beautifully sung: your mind forms concepts about it and you feel pleasure. Or it may happen that your critical faculty—which is one form of the application of concepts to percepts—tells you it is bad music, or full of mistakes, or out of tune; and your feelings will follow your verdict. Always you will find—save in the one imaginary case where your reaction attains the absolute zero of complete indifference—that you either like or dislike a thing to some extent, however small. The psychologist calls these feelings "pleasure" and "pain", and though such words sound rather portentous when applied to cases near the indifference line, yet they are useful terms. If you are not clean you must be dirty, to however small a degree. In the room where I am writing these words there is a clock which ticks loudly enough to be audible, and I wish it wouldn't. It would never occur to me to say, in mentioning the fact, that my experience was painful; but my feeling about it does come, psychologically, into the category of pain, simply because I would, if I could, stop it.

It is not necessary, at this point, that the musician should know more than the bare outline of the physical process by which sensory impulses (i.e. the nerve-impulses from the sense-organs) reach the brain; though later on, in considering instrumental technique, the matter will come up again. But there is one fact which ought to be noticed. When a friend speaks to you on the telephone the vibrations of his voice are conveyed to your ear along a wire; and your voice travels back to him along the same wire. If, for the moment, you look on your senses as five friends—which they are—telling you about something that has happened, their messages came to you along wires; but your messages back have another set of wires to carry them. These body-wires are called *Nerves*, and they are real material things—like thin silken threads, forming a network of communication all over your body. The nerves from the surface of the body to the brain are technically called *Afferent* or *Sensory* nerves; those which, when you have decided what steps to take, carry back a message to your muscles are the *Efferent* or *Motor* nerves.

If you get out of bed and step on a tintack your touch-sense immediately telephones a message along its afferent nerve to your brain which is decoded by your perception into "Right foot big toe on

intack". If reflex action, or instinct, or previous experience has not already led to a kind of automatic withdrawal on your part then you consider the case (for however short a moment) and send a message along an efferent nerve to your foot-muscles to remove your toe, and probably another message to your eye, along another efferent nerve, telling it to have a look and see if any serious damage has been done.

It is always the desire of people who analyse things to group them into classes; and it is a useful method of co-ordinating knowledge, so long as it is realized that such classes, with their divisions and subdivisions, are seldom really watertight compartments. So, in dealing with Reaction, psychologists have agreed that it can best be dealt with under three headings :

(1) *Reflex Action.* This class includes all those purely bodily movements which are performed by the "machine" and are normally outside the control of the mind. If a speck of dust touches your eyelashes then you will blink your eye; which is nature's mechanical method of saving your eye from getting things into it. That is a reflex action. It is possible in some cases—in this one, for instance—to inhibit the action by will-power, if you know beforehand when the test is going to be made. You might, for example, allow me to touch your eyelashes and send an order to your eyelid (along an efferent nerve) at all costs not to blink. But if, taking you unawares, I do it again five seconds later, the reflex will work for a certainty. Such actions, you will readily see, are essentially physiological, and are only tabulated by psychologists to make their classification of reactions complete. They are Native Reactions of the most primitive form.

(2) *Instinctive Reaction.* This is Native Reaction of a somewhat more sophisticated kind since it is, in however rudimentary a way, purposive. From the moment of our birth, whether we are human beings, or kittens, or tigers, we have to face a hundred incidents every day of our lives to which we are forced to react. *How* we will react in any given situation, before we have had the benefit of any training or advice, depends on our disposition; which is the sum total of all the qualities we happen to have inherited, through no virtue or vice of our own, from a long line of ancestors. In recent years biologists have discovered many very interesting things about heredity; but I do not think any one of them would risk a wager on what kind of disposition will appear in the child of any two parents, either in human beings or animals. In the same litter of puppies you will find one that has in-

herited its mother's calm tractability, another its father's pugilistic ferocity. Any one of you may have inherited a maternal grandmother's unselfishness and a paternal grandfather's skill in games; whilst your brother may have had the bad luck to inherit a paternal grandmother's conceit and a maternal grandfather's addiction to drink. We enter the cradle as a mixture of inherited tendencies for which we are not in the least responsible, and all our reactions will be in accordance with them unless in later life we learn to modify them through training and education.

(3) *Acquired Reaction.* The last paragraph may seem, at first sight, to paint a rather grim and gloomy picture of human nature; and not many years ago it would assuredly have been denounced as materialistic, pessimistic, and even irreligious. Nowadays it is so universally accepted as a starting-point for the study of ourselves that it might almost be called the first axiom of any thinker who wishes to look facts in the face. Nor need those facts in themselves alarm anyone, for they imply but one thing: that the whole of our training and education is in reality but one prolonged endeavour to substitute acquired reactions for native ones. It is the simplest of identities: being educated =acquiring reactions which are not native to us. If you were to make a list of all the things you had done in any one day of your life you would be astonished at the overwhelming proportion of them which you would never have done, or would have done quite differently, but for your upbringing. Why did you wash yourself, or do your hair? Why did you refrain from sniffling? Why did you greet anyone with a smiling "good morning", or write a letter to a sick friend, or say please when you asked for the salt, or go and practise your scales? You would have done none of these things if you had been left severely alone when young, and no one had ever taught you the elements of living.

To you as teachers this matter is more important than at first it appears. We are all of us apt to look on a naturally happy and obedient child as "virtuous", and on a quick and clever pupil as "gifted", and to feel aggrieved if we have to teach a slow or difficult child. But wise teachers know that to have the latter kind of pupil is a piece of luck. It is a challenge to them which they should accept gladly. The great minds of the world have not always been more brilliant as children than their companions, and some other teacher exists who would succeed with any pupil you are likely to have. And the challenge to you, that you should see if you can substitute acquired reactions for native ones, is a compliment paid you by Fortune, and you should accept it with both hands.