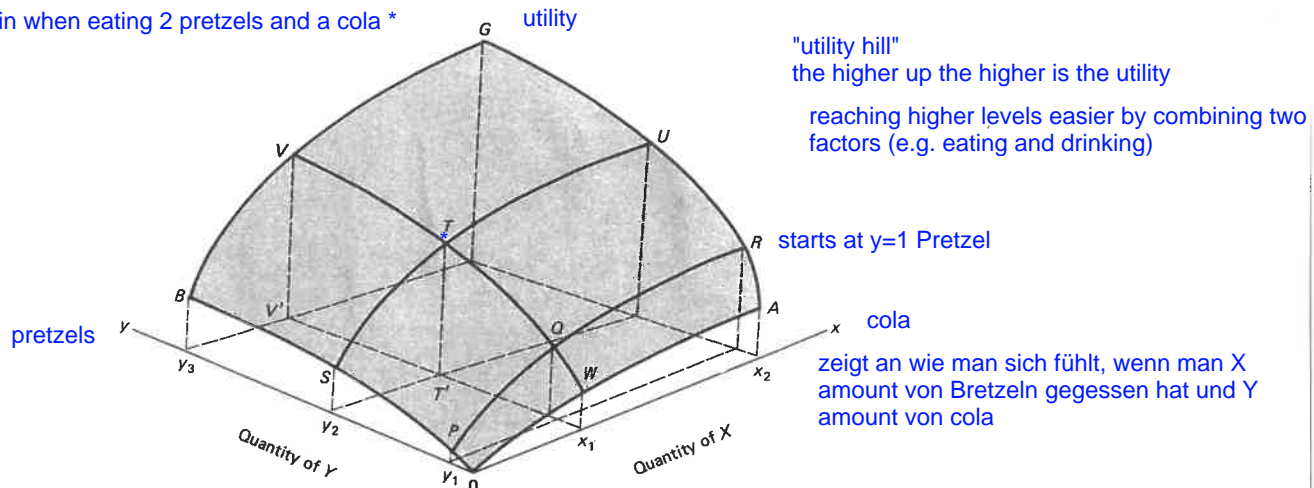
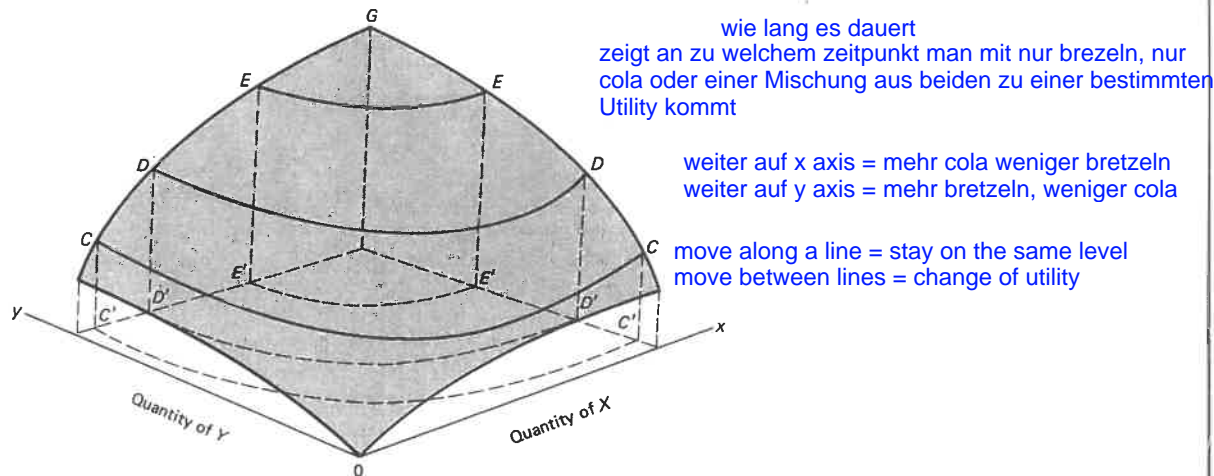


**FIGURE 3.3 A Cardinal Total-Utility Function of Two Goods**

Utility is measured up from the page, and the horizontal axes  $x$  and  $y$  represent quantities consumed of commodities  $X$  and  $Y$ . The curves  $OA$ ,  $PR$ ,  $SU$ , and  $BG$  along the surface show how Total Utility changes as  $x$  increases, holding  $y$  constant (at a different level for each curve). Similarly the curves  $OB$ ,  $WV$ , and  $AG$  show how Total Utility changes as  $y$  increases, holding  $x$  constant.

**FIGURE 3.4 Cardinal Utility and Indifference Curves**

The surface here is the same as in the preceding diagrams, but the curves *along the surface* ( $CC$ ,  $DD$ ,  $EE$ ) are contours that connect points with equal heights (levels of utility). The projections of these curves onto the base plane (the dashed  $C'C'$ ,  $D'D'$ ,  $E'E'$ ) are indifference curves.

**FIGURE 3.5 Indifference Curves and Preference Directions: Ordinal Utility**

Here the cardinal scaling of utility has been stripped away, and we are left with the indifference curves. These indifference curves, together with the preference directions, give us all the information needed to rank alternative consumption baskets in terms of *ordinal* utility.

